UNIVERSIDADE FEDERAL DO PARANÁ

MATHEUS DE MELLO LARANJEIRA

ON BRAZILIAN INVESTMENTS AND TRADE: FOREIGN DIRECT INVESTMENT COMPOSITION AND ITS IMPACTS ON INTRA-INDUSTRY TRADE

CURITIBA PR

2022

MATHEUS DE MELLO LARANJEIRA

ON BRAZILIAN INVESTMENTS AND TRADE: FOREIGN DIRECT INVESTMENT COMPOSITION AND ITS IMPACTS ON INTRA-INDUSTRY TRADE

Dissertação apresentada como requisito parcial à obtenção do grau de Mestre em Economia no Programa de Pós-Graduação em Desenvolvimento Econômico, Setor de Ciências Sociais Aplicadas, da Universidade Federal do Paraná.

Área de concentração: *Desenvolvimento Econômico*.

Orientador: Profº. Dr. Maurício Bittencourt.

Coorientador: Profº. Dr. Honório Kume.

CURITIBA PR

2022

DADOS INTERNACIONAIS DE CATALOGAÇÃO NA PUBLICAÇÃO (CIP)
UNIVERSIDADE FEDERAL DO PARANÁ
SISTEMA DE BIBLIOTECAS – BIBLIOTECA DE CIÊNCIAS SOCIAIS APLICADAS

Laranjeira, Matheus de Mello
On brazilian investments and trade : foreign direct investment composition and its impacts on intra-industry trade / Matheus de Mello Laranjeira. – Curitiba, 2022.
1 recurso on-line : PDF.

Dissertação (Mestrado) – Universidade Federal do Paraná, Setor de Ciências Sociais Aplicadas, Programa de Pós-Graduação em Desenvolvimento Econômico.
Orientador: Prof. Dr. Maurício Bittencourt.
Coorientador: Prof. Dr. Honório Kume.

1. Investimentos estrangeiros direto. 2. Comércio intra-industrial. 3. Barreiras tarifárias. 4. Barreiras não tarifárias. I. Bittencourt, Maurício. II. Kume, Honório. III. Universidade Federal do Paraná. Programa de Pós-Graduação em Desenvolvimento Econômico. IV. Título.

Bibliotecária: Maria Lidiane Herculano CRB-9/2008

MINISTÉRIO DA EDUCAÇÃO
SETOR DE CIÊNCIAS SOCIAIS E APLICADAS
UNIVERSIDADE FEDERAL DO PARANÁ
PRÓ-REITORIA DE PESQUISA E PÓS-GRADUAÇÃO
PROGRAMA DE PÓS-GRADUAÇÃO DESENVOLVIMENTO
ECONÔMICO - 40001016024P0

TERMO DE APROVAÇÃO

Os membros da Banca Examinadora designada pelo Colegiado do Programa de Pós-Graduação DESENVOLVIMENTO ECONÔMICO da Universidade Federal do Paraná foram convocados para realizar a arguição da Dissertação de Mestrado de **MATHEUS DE MELLO LARANJEIRA** intitulada: **ON BRAZILIAN INVESTMENTS AND TRADE: FOREIGN DIRECT INVESTMENT COMPOSITION AND ITS IMPACTS ON INTRA-INDUSTRY TRADE**, que após terem inquirido o aluno e realizada a avaliação do trabalho, são de parecer pela sua APROVAÇÃO no rito de defesa.

A outorga do título de mestre está sujeita à homologação pelo colegiado, ao atendimento de todas as indicações e correções solicitadas pela banca e ao pleno atendimento das demandas regimentais do Programa de Pós-Graduação.

CURITIBA, 16 de Fevereiro de 2022.

Assinatura Eletrônica
09/03/2022 09:24:56.0
MAURICIO VAZ LOBO BITTENCOURT
Presidente da Banca Examinadora

Assinatura Eletrônica
09/03/2022 10:36:03.0
MARCOS MINORU HASEGAWA
Avaliador Interno (UNIVERSIDADE FEDERAL DO PARANÁ)

Assinatura Eletrônica
08/03/2022 13:58:54.0
VICTOR RODRIGUES DE OLIVEIRA
Avaliador Interno (UNIVERSIDADE FEDERAL DO PARANÁ)

Assinatura Eletrônica
08/03/2022 14:46:43.0
GILBERTO JOAQUIM FRAGA
Avaliador Externo (UNIVERSIDADE ESTADUAL DE MARINGÁ)

Assinatura Eletrônica
08/03/2022 14:19:03.0
HONORIO KUME
Coorientador(a) (UNIVERSIDADE DO ESTADO DO RIO DE JANEIRO)

"Only the educated are free."

- Epictetus

ACKNOWLEDGEMENTS

Primeiramente, gostaria de agradecer à Deus, pois sem Ele nada disso seria possível.

Agradeço imensamente à minha esposa, Clara Simões, por todo o suporte, carinho, amizade, amor e coragem que me fizeram seguir em frente.

Agradeço também ao apoio oferecido pela minha familia, em especial aos meus pais Guilherme e Lucinea Laranjeira, mas também ao Vinícius Laranjeira, Marcos Simões, Simone Simões e Nina Simões.

Sou grato pelos meus orientadores, professor Dr. Maurício Bittencourt e professor Dr. Honório Kume, por todo o suporte, sugestões, apoio e por serem meus guias nessa tarefa.

Agradeço pelos membros da banca, professor Dr. Marcos Hasegawa, professor Dr. Victor Rodrigues e professor Dr. Gilberto Fraga por prestigiarem o meu trabalho, com questionamentos, sugestões e conselhos para que o mesmo evoluísse.

Agradeço aos meus queridos amigos Isabela Bastos, Raphael Montes, Lucas Castro, Thainá Marques e Daniel Rodrigues, pela amizade especial e por estarem comigo durante todos esses anos de caminhada.

Agradeço aos meus companheiros da turma do PPGDE, principalmente ao Pedro Meiners, Eduardo Prado, Gabriela Zilli, Marcelo Lima e Ana Tedesco, por toda a amizade e parceria, todos os debates e conversas que, durante esses dois anos de mestrado e pandemia, foram imprescindíveis.

Por fim, gostaria de deixar meus agradecimentos também ao Leonardo Kazeker, Fernanda Kratochwil, Marcos Dias, Julia Coimbra e Renan Matias, pois o apoio e suporte oferecidos por eles também foram vitais para essa conquista.

RESUMO

O presente trabalho busca investigar dois fatores da economia brasileira, sendo eles o investimento estrangeiro direto e o comércio intra-industrial. A dissertação é composta por dois ensaios, cada um focado em um dos fatores previamente citados. O primeiro ensaio foca no investimento estrangeiro direto e seus determinantes e, através de um modelo de séries temporais múltiplas, busca entender o impacto de fatores como abertura comercial e qualidade institucional na atração desses investimentos. O segundo ensaio aborda o comércio intra-industrial brasileiro. Através de uma metodologia amplamente utilizada pela literatura, o comércio brasileiro é desagregado entre comércio inter-industrial e intra-industrial, sendo este separado pela qualidade do produto, entre comércio intra-industrial horizontal, comércio intra-industrial vertical superior e comércio intra-industrial vertical inferior. Em seguida, cada tipo de comércio intra-industrial é estimado através de um modelo gravitacional para que os impactos do investimento estrangeiro direto, barreiras tarifárias e não tarifárias possam ser analisados. Em conclusão, os resultados de ambos os ensaios apontam para os efeitos negativos que um baixo nível de qualidade institutional pode gerar nos ingressos de investimento estrangeiro direto e, como esses mesmos investimentos, podem impactar positivamente o comércio intra-industrial brasileiro, contrapondo os efeitos nocívos de barreiras ao comércio, tanto tarifárias quanto não tarifárias.

Palavras-chave: Investimento Estrangeiro Direto; Qualidade Institucional; VAR; Comércio Intra-Industrial; Barreiras Tarifárias; Barreiras Não-Tarifárias

ABSTRACT

The present work aims to investigate two factors from the Brazilian economy, the foreign direct investment and intra-industry trade. The dissertation is composed of two essays, each one focused on one of the previously cited factors. The first essay focus on foreign direct investment and its determinants and, through a multiple time-series model, aims to understand the impact of factors such as trade openness and institutional quality on the attraction of these investments. The second essay approaches the Brazilian intra-industry trade. Using a well known, the Brazilian trade is disaggregated between inter-industry trade and intra-industry trade, while the latter is separated by commodity's quality, between horizontal intra-industry trade, higher vertical intra-industry trade and lower vertical intra-industry trade. On the following, each intra-industry trade type is estimated by a gravity model, so the impacts from foreign direct investment, tariff barriers and non-tariff barriers can be analyzed. Concluding, the results from both essays points to the negative effects that a low institutional quality level can cause on foreign direct investment inflows and, how these same investments, can have a positive impact on Brazilian intra-industry trade, opposing the harmful effects from trade barriers, both tariff and non-tariff.

Keywords: Foreign Direct Investment; Institutional Quality; VAR; Intra-Industry Trade; Tariff Barriers; Non-Tariff Barriers

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

FDI	Foreign Direct Investments
IFDI	Inward Foreign Direct Investments
MNE	Multinational Enterprise
UNCTAD	United Nations Conference on Trade and Development
OECD	Organisation for Economic Co-operation and Development
GDP	Gross Domestic Product
VAR	Vector Autoregressive Model
VEC	Vector Error Correction
MERCOSUR	*Mercado Común del Sur*
PTA	Preferential Trade Agreement
ASEAN	Association of Southeast Asian Nations
MENA	Middle East and North Africa
BCB	Banco Central do Brasil
BPM6	Balance of Payments and International Investment Position Manual
SGS	*Sistema Gerenciador de Séries Temporais*
IBGE	*Instituto Brasileiro de Geografia e Estatística*
IPEA	*Instituto de Pesquisa Econômica Aplicada*
FOB	Free on board
ICRG	International Country Risk Guide
IMF	International Monetary Fund
COPOM	*Comitê de Política Monetária*
IET	Inter-Industry Trade
IIT	Intra-Industry Trade
TWT	Two-Way Trade
OWT	One-Way Trade
HIIT	Horizontal Intra-Industry Trade
VIIT	Vertical Intra-Industry Trade
NTB	Non-Tariff Barrier
EEC	European Economic Comunity
FTA	Free Trade Agreement
EU	European Union
R&D	Research and Development

CONTENTS

Part I

Introduction

Investment has been known to cause a great impact on both trade and economic development of a country and, among the investment types, foreign direct investments (FDI) was pointed by researchers to be an interesting one due to the development of modern economic environment on recent decades. Since FDI can affect economic development, enhance technology and knowledge through spillover effects and trade development, it became crucial to understand its determinants and dynamics, specially on a globalized economy. With growing multinational enterprises (MNE), recent studies points not only to FDI determinants, but also for its various outcomes, which can include trade development.

As noticed in the 60s', international trade displayed a new pattern that contradicted traditional theories, showing the existence of trade within matching industries, where two distinct countries exchanged the very same good. This new phenomenon was focused on by both theoretical and empirical studies throughout the decades, which developed new theories, models, indexes and unveiled its determinants on an effort to understand this new Intra-Industry Trade (IIT).

Recognizing the importance of these two topics for any country on the modern days – especially with a globalized economy, interconnected trade and multinational firms – and the fact that the major part of studies for them are mainly focused on developed countries (e.g. USA or European countries), the following two essays focus on Brazil, aiming to expand the understanding on both subjects, its impacts and how they are connected.

The first essay develops a research on FDI attraction (i.e. Inward Foreign Direct Investment) and its determinants, aiming to understand how variables, such as GDP, trade openness or institutional quality, impacts the foreign agent decision. Through a multiple time series analysis, the work aims to develop a series of Impulse Response Functions (IRFs) and variance decompositions to display how IFDI responds to impacts caused by its determinants throughout the time. The work uses a wide selection of datasets from various sources, such as BCB (*Banco Central do Brasil*), IPEA (*Instituto de Pesquisa Econômica Aplicada*) or PRS Group to achieve this objective.

The second essay focuses mainly on International Trade. Looking solely to Intra-Industry Trade (IIT), the second study aims to understand its characteristics and how the previously focused IFDI, along with trade barriers, affects it. Constructing a wide dataset for trade considering each commodity and partner country and disaggregating IIT by commodity's quality, this essay runs a series of gravity equations for each detected type of IIT. As a result, empirical evidence is displayed for the impacts of investments inflow and trade barriers on each Brazilian IIT type.

Together, the two essays uncover meaningful results on both Brazilian trade and investments, providing empirical evidence on its determinants and how each one affects them. At the end of this dissertation, a conclusion will be presented and the findings from both essays will be highlighted.

Part II

On Foreign investments and its Determinants : A case for Brazil

II.1 INTRODUCTION

On the international economy, investment has proven to be a main driver for economic development, employment creation, technological improvement for countries and profit for multinational enterprises (MNE), with this in mind, this first essay aims to deepen our understanding on a specific type of investment know as Foreign Direct Investments (FDI). Unveiling the main determinants of Brazilian inflow of these investments, shedding a light on how it responds to these determinants, can be crucial to understand its dynamics and to seek clues on what economic and/or political strategies could be implemented and to attract higher investment inflows (Yao, 2006).

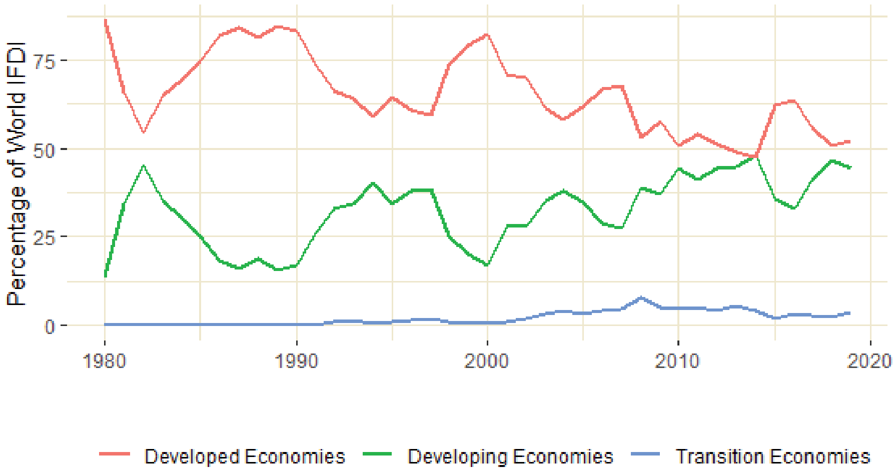
FDI can induce economic development by integrating the host country on the global economy and trade, creating employment, promoting technological and knowledge transfers, raising productivity of physical capital and improving skills of human capital on the host country, which improves the overall social welfare. A large number of works have been focused on these foreign investments, aiming to uncover their determinants and measure its impacts, but since different countries display different economic environments, the patterns exhibited by each country are different, with no equal determinants and impacts magnitude, which led to some contradicting results.

Based on United Nations Conference on Trade and Development (UNCTAD) data (figure II.1.1), developed countries (specially OECD countries) always attracted the major share of foreign direct investment (e.g. 63.78% of total IFDI on 2016 alone), resulting on a vast array of research on its determinants but, since the flows of FDI headed to developing countries rose, understanding the determinants of these countries became relevant, leading to works such as Economou et al. (2016), Sekkat and Veganzones-Varoudakis (2007) and Kok and Ersoy (2009).

On 2000, IFDI captured by developed countries corresponded to 82.49% of total IFDI – absorbed mainly by United States (23.14%), Germany (14.61%), United Kingdom (8.49%), Belgium (6.51%) and Canada (4.92%) – but its share diminished since, while developing countries increased its inflows to a point where it briefly surpassed the developed countries. On 2014, developing countries attracted 48.24% of IFDI while developed economies amounted to 47.69%, these results occurred once, reverting on the following years, although the gap remained low (UNCTAD, 2020).

Despite the economic crisis on 2008, Latin America saw its investment share increase due to commodities, reaching 9.32% of total IFDI – an increase of 50% from the previous year – which represented a higher share than Oceania, Northern, Southern and Western Europe (UNCTAD, 2020). Although the high share of FDI, the inflows were concentrated on few countries and FDI was able to positively impact only the ones with the highest incomes (i.e. Chile and Uruguay). The Upper middle income countries – which includes Brazil – didn't present

Figure II.1.1: Inward Foreign Direct Investment flows



Source: Author's own elaboration based on UNCTAD data.

significant impacts on its GDP, indicating that these countries should focus on economic policies that promote FDI inflows to increase and stabilize economic growth (Alvarado et al., 2017)

Looking to Brazil, we can see that it became a major destiny for FDI, on 2000 it attracted the highest share of FDI on Latin America, were it reached 2.42% of global IFDI followed by Mexico, which attracted 1.35% (UNCTAD, 2020). On 2005, it surpassed all South American countries, attracting 1.59% and, on 2008, amidst a global economic crisis, it attracted 3.02%, behind only to the British Virgin Islands (3.52%). Between 2010 and 2012, Brazil was the leading country for foreign investment, a position it would recover on 2017 and maintain until 2019, with 4.67% of global FDI attracted (UNCTAD, 2020). All these inflows got the attention of researchers such as de Mattos et al. (2007), Peres and Yamada (2014), de Castro (2012) and Moro et al. (2020).

On this context, we seek to contribute to the literature about IFDI on Brazil – since developing countries have been attracting higher inflows on the past years – by analysing its main determinants through a Vector Autoregressive Model (VAR). The work approaches variables that are known to be significant for developing countries – such as GDP, interest rates and exchange rate – and seek to understand how political variables affect the foreign investor's perception on the Brazilian economy.

The present work is structured as follows: chapter II.2 presents a brief historic overview on foreign direct investment inflows on Brazil and some theoretical and empirical literature on the IFDI determinants; chapter II.3 describes the data and its sources, along with the econometric methodology that was implemented. The process and the empirical results are discussed on chapter II.4 and, lastly, chapter II.5 concludes.

II.2 LITERATURE REVIEW AND EVIDENCES

II.2.1 A BRIEF HISTORIC OVERVIEW ON BRAZILIAN FDI INFLOWS

Historically, Brazil relies on foreign direct investment (FDI) as fuel for its industrial development process. Between 1860 and 1902, the Brazilian economy was mainly dependent on British inflows, which corresponded to 77.6% from the total IFDI and was targeted to coffee production and exports, pointing out to a low importance of the industrial sector. Although the accounting information is scarce for the period, we can conclude that Brazil wasn't a major destination for the British FDI, since Latin America attracted only 10.5% of total FDI (Curado and Cruz, 2008).

After 1902, the source of IFDI starts to change. With British production competitiveness falling, due the growth of German and North-American industries, British investments that targeted Brazilian economy drops to 53% of total IFDI, while US and Canada appear. However the destination of these investments do not change, whereas the coffee production continues to be the main reason for investment attraction (Castro, 1976; Curado and Cruz, 2008).

North-American investments continued to grow on the Brazilian economy after 1914, even when Brazil stood as a secondary destination for these investments. While certain industries were already dominated by British investments, manufacturing industries presented themselves as an opportunity, since it displayed a growth pattern that didn't occur in other Latin American countries (Villela and Suzigan, 1975; Curado and Cruz, 2008). After the WWII, North America established itself on the international economic scenario, specially after the Bretton Woods treaty, which forged new rules for the post-war international monetary system.

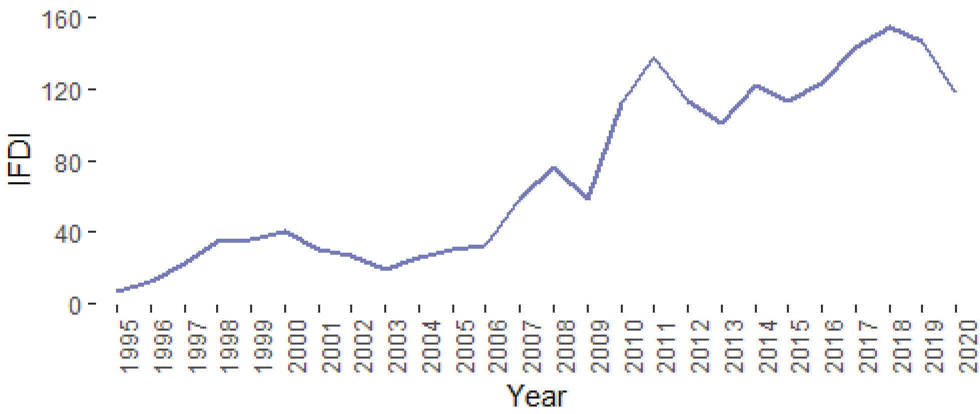
On late 40's and 50's FDIs faced a favorable international scenario. In Brazil, Possas (1998) noted that there was an increase on foreign subsidiaries, increasing the investments on different sectors (e.g. electrical equipment, paper or textile industry). During the 50's, there was a boom on the investments inflow – where the increase on FDI flows more than tripled compared to the previous stock – and that tendency maintained itself during the following decades, were the FDI flows reached US$ 2.48 bn on the 60's and US$ 9.6 bn at the end of the 70's[1]. The literature looks to the industries targeted by these investments between 1955 and 1980, a period know as "heavy industrialization", and establishes that FDI played a major role on the industrialization process of Brazil, which would be unfeasible without it.

The 80's decade became a turning point for the Brazilian economy and its relationship with foreign investors, causing the investment inflows to fall, reaching a low point of US$ 317.2 MM on 1986 alone[2], due to the external debt crisis. The low levels of FDI were stagnated until the 90's, were trade liberalization and financial deregulation policies took place.

[1]Data presented on Curado and Cruz (2008)
[2]Santos et al. (2016)

On 1994 *Plano Real* was implemented during Itamar Franco's government. Characterized by an economic background with high inflation rates, it was the 13^{th} plan that targeted monetary stabilization and, with favorable macroeconomic and political environment conditions, the plan was successful. Due to the monetary stabilization, foreign investors' attention was caught and, as a result, the investment inflows intensified, going from US$ 2.3 bn on 1993 to US$ 3.2 bn on 1994, US$ 6.3 bn on 1995 and US$ 12 bn on 1996 (do Brasil, 2021). FDI inflows also took advantage of other factors, such as privatization policies and the beginning of MERCOSUR (*Mercado Común del Sur*).

Figure II.2.1: Annual Inward Foreign Direct Investments



Source: Author's own elaboration based on BCB data.

As shown on figure II.2.1 on 2000 Inward FDI reached the highest point at that time, with US$ 40.2 bn flowing into the Brazilian economy due to its privatization process, which gained traction during Fernando Henrique Cardoso's (FHC) government. On the following year, Brazil was affected by external and internal factors and FDI inflows decreased, international economy changed due to episodes involving frauds, wars and the 9/11 terrorist attacks while Brazil suffered with energetic crisis and lower privatizations (Gregory and Oliveira, 2005; Moro et al., 2020).

Even with uncertainties by the beginning of the 2000's, Brazil saw its position as a destination for FDI strengthen, attracting foreign investments, especially due to the commodities boom. On 2004, FDI flows rose again due to the expectations on Lula's term of office. Beginning on 2004, Brazil sustained an economic development with an average GDP growth of 4.8% until 2008, when the international economic crisis discontinued it, and was able to recover from it only on 2010.

The stable macroeconomic factors resulted on a lower risk perceived by international agents, which led to lower risk ratings, attracting foreign investments. These aspects helped Brazil start as a major target for FDI, becoming the 8^{th} receiver country of FDI by the beginning of the following decade, on 2011 (Giambiagi, 2016; Ribeiro and Filho, 2013).

II.2.2 LITERATURE REVIEW

II.2.2.1 FDI and its determinants

Foreign Direct Investments take place when an agent (a firm or an individual) establishes an investment abroad, acquiring local assets or beginning business operations, resulting on an opportunity to the host country to expand its production, productivity and/or technology. Markusen (1995) and Markusen and Venables (1999) distinguish FDI by the firm's goal, classifying between Horizontal and Vertical FDI. Horizontal FDI (or market-seeking FDI) occurs when a foreign firm aims to supply the domestic market with similar products that are also produced on its home country, whereas Vertical FDI (or resource-seeking FDI) occurs based on the geographical disaggregation of the production process, adopted by firms as a strategy to seek for cheaper production factors, aiming to lower production costs.

Several studies approached the determinants of FDI to understand how each variable – such as GDP growth, human capital, trade openness and even military spending – can impact the agents decision process since these investments have been a core variable to the economic development and integration, also due to its stableness during crises, when compared than other types of capital flows (Blonigen, 2005; Lipsey, 2001; Majeed and Ahmad, 2009).

The traditional OLI framework (ownership, location and internalization) developed by Dunning (1977, 1981) appeared to explain which circumstances could be perceived as an advantage to the firm so it decides to engage and the direct investment would emerge. The framework approached the following factors on the decision making process since production on foreign countries is followed by high costs. Ownership represents the aspects of the product or production process that are unique to a specific firm, it could be tangible or intangible, such as patent, trade secret, blueprint, production technique, trademarks or even the firm's own reputation. Location represents the advantages a host country must offer so a firm decides to produce abroad instead of exporting from its home country (e.g. natural resources or cheap production factor). Internalization focuses on the cost of transferring technology and knowledge through licenses or selling patent/blueprints to foreign firms instead of setting a subsidiary abroad and producing it internally. (Markusen, 1995; Bevan and Estrin, 2004)

The growing body of literature on FDI determinants usually focus on traditional global push and country-specific pull factors, such as exchange rate (Froot and Stein, 1991; Klein and Rosengren, 1994; Grubert and Mutti, 1991; Swenson, 1994; Desai et al., 2004a; Campa, 1993; Goldberg and Kolstad, 1995), taxes (Hartman, 1984, 1985; de Mooij and Ederveen, 2003; Scholes and Wolfson, 1990; Jr., 1995; Desai et al., 2004b; Desai and Jr., 1999), institutions (Wei, 2000a,b; Wheeler and Mody, 1992; Stern, 2003; Kostevc et al., 2007) and/or trade (Kogut and Chang, 1996; Buckley and Casson, 1981; Head and Ries, 2001; Swenson, 2004; Lane and Milesi-Ferretti, 2000; Campos and Kinoshita, 2003), that will be discussed on the following sections.[3]

[3]For a wider review on FDI determinants literature, see Lim (2001)

II.2.2.2 Market and trade

Market size – expressed by real GDP or GDP per capita – has been the most accepted and significant factor that determine the FDI flows, by impacting attractiveness of foreign investors, since foreign firms could expand its production plants aiming to capture part of the domestic market (Arbatli, 2011; Chakrabarti, 2001; Shatz and Venables, 2000; Wheeler and Mody, 1992; Lim, 2001).

Other market conditions were also pointed as important elements that are considered on the investors' decision making process, since these are sensitive to cost and risk. Robust empirical results supports that macroeconomic variables such as inflation and exchange rate influence the decision making process, since high inflation rates could represent market instability – which express higher risks – and exchange rates could change the type of investment if the host economy is export oriented (Bevan and Estrin, 2004; Arbatli, 2011; Krifa-Schneider and Matei, 2010).

Trade openness also have been a major factor for the investors decision with mixed results. Researches point that lower trade costs induce the FDI towards the geographic separation of the production chain while high trade costs stimulate investments to replace exports, setting up local plants to supply local markets (Lim, 2001; Ismail and Yussof, 2003).

Trade barriers (e.g. trade tariffs or quotas) could diminish profitability, which is undesirable by investors. On the other hand, countries that develop policies and/or engage on trade agreements targeting trade liberalization attracts investors since, according to Helpman (2006), trade liberalization generates higher average productivity. Empiric results from Trefler (2004) for the Canada-U.S. free trade agreement supports these statements.

Some of the literature linking FDI and Preferential Trade Agreements (PTA) establish a positive relationship between them and show that FDI can be impacted by PTAs through four mechanisms: non-trade provisions (e.g. Services and investment liberalization), merchandise trade liberalization, extended market and economic growth (Medvedev, 2012). Empirical results from Adams et al. (2003) found that non-trade provisions (e.g. protection of intellectual property, competition policies, harmonization of standards) from PTAs have been responsible for investment creation.

II.2.2.3 Corporate taxes and tariffs

As perceived by economic literature, taxes and tariffs constitute as a meaningful factor when MNEs make investment decisions, causing a significant negative impact since high tax rates usually represents lower net return on the investment, decreasing the probability of a production plant being located in a host country (de Mooij and Ederveen, 2003; Gordon and Jr., 2002; Hines, 1999).

Double taxation also has been an approached issue by the literature, since a foreign investment on subsidiaries could generate income tax on both host and home country. On an effort to avoid that double taxation dampen investment stimulus, some countries sign bilateral tax treaties, adopt a credit system – where the value paid on taxes abroad can be claimed to decrease the value paid on it home country – or permit tax deferral, so the reinvested profits has its taxes deferred until they're repatriated (Hines, 1999; Blonigen, 2005; de Mooij and Ederveen, 2003).

Using a panel on 11 OECD countries for the period between 1984-2000, Bénassy-Quéré et al. (2005) aims to approach the issue on tax differentials and, after accounting for agglomeration and double taxation effects, the results show that high corporate taxation does lead to a negative influence on FDI inflows.

Looking to the financial sector, Merz et al. (2017) uses a logit approach to analyse the impact of taxes and regulations on the investment decisions of 839 MNEs. The results found show that the impacts of taxes are heterogeneous among the firms. Moreover, high taxes, along with stricter regulations, expel FDI on financial sector, although the responsiveness to tax and regulatory policies variations are heterogeneous across countries.

II.2.2.4 Institutional quality

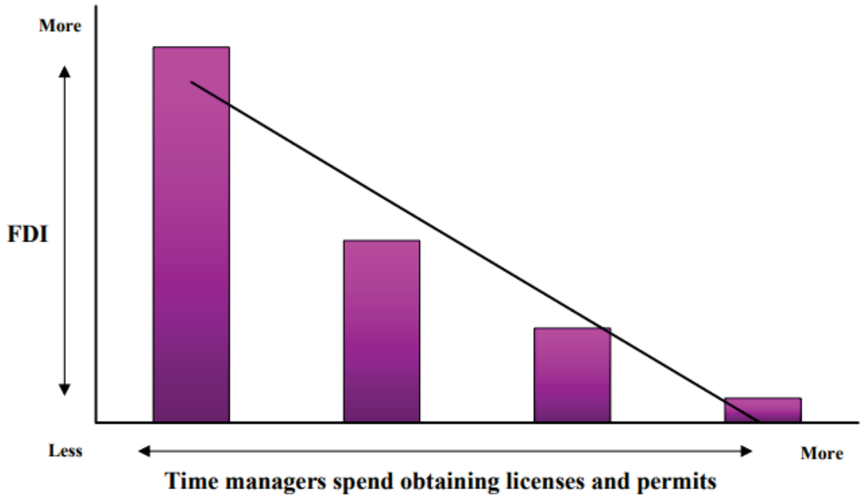
On the past three decades, research on institutions have shown that Institutional Quality is a major factor for a country's economic development. Civil and property rights, rule of law, good governance – among other factors – boost development and can diminish macroeconomic instability, making it easier for investment planning. Since then, countries that presents low-quality institutions and high corruption levels often represent higher sunk-costs and lower profitability given that, low property legal protection, indicates high risks of expropriation from firms' assets, making it less likely that an investment occurs. (Acemoglu et al., 2004; Stern, 2003)

Investments requires several economic factors to be stable so it can take place. According to Stern (2003), Since firms' investments are intertwined with development, government agents must be focused on providing three main factors: Stable macroeconomic scenarios, infrastructure and good governance and institutions.

Macroeconomic stability should be reached through economic indicators (e.g. fiscal transparency and stability, good governance, low inflation or free trade) to decrease the long term risk, providing fertile ground for firms. Infrastructure should be enhanced, since poor quality could impact the costs and production of firms. Poor power supply, water supply or transports can mitigate the competitiveness and even dissuade investments, especially foreign investments. Strong institutions with good governance are also a main concern. Poor institutional indicators like corruption, bureaucracy, contract enforcement, rule of law and regulations can be linked with poor investments, as shown by figure II.2.2, where the governmental bureaucracy is associated with FDI levels (Stern, 2003).

On contrast to other varieties of investments (e.g. portfolio investments), FDI are more vulnerable to institutional flaws, since it has greater proximity with governmental agents and regulation agencies, firms that aims to execute this type of investment are more likely to suffer higher costs from corruption.

Figure II.2.2: Time spending with bureaucracy and FDI levels



Source: World Bank (2003) Global Economic Prospects.

Using panel data and cross-section for gravity equations, Bénassy-Quéré et al. (2007) approached bilateral FDI to unveil the effects of institutions and find that not only bureaucracy and corruption matter to inward FDI, but also variables such as information or legal institutions. The institutional distance also appeared to be significant and impacts bilateral FDI negatively. Also approaching institutional quality, Masron and Abdullah (2010) aims to explain its impact as a determinant for investment attraction for ASEAN (Association of Southeast Asian Nations) countries and show us that institutional quality is positive and significant, suggesting that institutional improvements could reverse the slowing trend of FDI inflows for the region.

While looking for the impacts of institutional improvements between 1995-2002 on FDI inflows from transition countries (i.e. countries that changed from a centrally planned economy to a free market economy), Kostevc et al. (2007) confirmed the pattern where good governance and institutional improvement affected significantly the levels of investments inflow, but the research also pointed to a curious result. While countries, such as Bulgaria and Romania, that presented an increase in GDP per capita relied its results on institutional improvements, Kazakhstan – a characteristic oil producer country – presented a large FDI even when its institutions' quality decreased after 2000, suggesting that institutional quality may not be as determining factor on countries with rich natural resources.

Looking to the Middle East and North Africa (MENA) countries, Daniele and Marani (2006) explore the role of institutions and its impacts on FDI and found that, although some of them made economic reforms, it wasn't enough to attract FDI and, aside Israel, the MENA countries couldn't revert the instability on political and macroeconomic scenarios, leaving it behind, especially when compared to European countries. The paper points that, in order to attract FDI for future development, the economic environment must undergo effective legal, economic and institutional reforms, to ensure a better business climate.

II.2.2.5 FDI on developing countries

OECD countries – especially US – were the major subject of research on early works that approached FDI determinants, due to its large share on world FDI and its available and reliable data. Although they were "left aside", throughout the years the developing countries got the researchers' attention.

As the works developed, it was perceived that the economic differences between developed and developing countries create distinct FDI patterns. The literature points out that investors considers different variables when deciding on investments for countries of these two groups. Economou et al. (2016) inspected the IFDI determinants of 24 OECD countries and 22 developing (non-OECD) through a panel data approach and found that variables such as gross capital formation and corporate taxation have a meaningful impact for developed countries, whereas, for developing countries, labor cost and institutional variables have a greater impact and more robust results.

Analyzing 21 developing countries across South Asia, Africa and Middle East, Sekkat and Veganzones-Varoudakis (2007) highlights the importance of investment climate, infrastructure endowment, economic and political environment to increase the attractiveness of a country for FDI, becoming even more important than the trade openness. Furthermore, business climate plays a crucial role when we look to the FDI inflows on these countries. For certain countries, assuring a stable and attractive business climate can be more important than infrastructure (Fung et al., 2005; Krifa-Schneider and Matei, 2010).

Since FDI has been regarded as an effective channel of technology transfer and economic growth, countries have not only mitigated restrictions that affect it, but also encouraged it, even by tax incentives (Kok and Ersoy, 2009).

The important role played by human capital is not exclusive to developed countries. Developing countries can also benefit from increasing human capital and, as a result, attract more FDI (Noorbakhsh et al., 2001; Gao, 2005). However, for the developing country government who aims to attract FDI through human capital, it must enhance it past the *take-off point* – a threshold where the country becomes attractive to foreign investment and advanced technology through human capital (Iwai and Thompson, 2012).

At last, these works suggest that developing countries' policy makers should focus on improving the quality of these determinants since foreign governments also compete to increase FDI inflows in its own country instead of others. Majeed and Ahmad (2009) advise some policy approaches that can increase IFDI, such as maintaining high economic growth rate, lowering tariff and non-tariff barriers to trade and improving infrastructure (e.g. telecommunications).

II.3 METHODOLOGY AND DATA

On the following section we describe the data gathered and the methodology of the study. Section II.3.1 presents the data used on the research and its sources. Section II.3.2 aims to discuss the available models and how we selected the one which was most suitable.

II.3.1 DATA

Since the present work aims to estimate the impacts of various factors on IFDI, we use data from several sources for the period between 1995-2019. We include the variables that were identified as crucial by the literature: GDP, Real exchange rate, trade openness, corruption index and interest rate.

Data for the Inflow of Foreign Direct Investment was provided by *Banco Central do Brasil* (BCB), published on the Balance of Payments, in accordance with the sixth edition of the Balance of Payments and International Investment Position Manual (BPM6)[1]. The data is provided in US$ millions and on monthly, quarterly and annual periodicity and is available for download on its website, starting on January 1995.

The Gross Domestic Product (GDP) data can also be found on BCB website. The database is built by the *Departamento Econômico - Banco Central do Brasil* (BCB-Depec) and is available on the SGS (*Sistema Gerenciador de Séries Temporais*). The official data on Brazilian GDP is measured by IBGE (*Instituto Brasileiro de Geografia e Estatística*) which publishes it quarterly.

Based on the IBGE data and values published on several industries, BCB-Depec estimates the monthly GDP on millions of *Reais* (R$) and US Dollars (US$). The present research uses the time series data on the latter currency.

The real exchange rate values are provided by IPEA (*Instituto de Pesquisa Econômica Aplicada*) and is measured through the nominal exchange rate – R$/US$ – multiplied by the ratio of prices (PI^*/PI). IPEA uses the US producer's price index (PPI) and the Brazilian *Índice de Preços ao Produtor Amplo - Disponibilidade Interna* (IPA-DI). The base is fixed as a mean of the values observed on 2010 (2010's mean = 100).

Trade openness is calculated with data for exports and imports. The monthly data on trade is provided by Comex Stat, a system that gathers data on brazilian international trade from SISCOMEX (*Sistema Integrado de Comércio Exterior*). The data provided is measured on US$ and the values for both exports and imports are FOB (Free On Board).

For Corruption and Institutional Quality we use the ICRG (International Country Risk Guide) dataset provided the PRS Group, a company specialized on risk ratings for a large number

[1]Published by the International Monetary Fund (IMF) on 2009 and adopted by Brazil on 2015

of countries and factors. The dataset is used by various works on the literature and is reliable, as pointed by Arbatli (2011), "These ratings are subjective; however, they are calculated consistently over time and across countries".

The variable used is the Political Risk Rating, which is developed to analyze the political stability of various countries. Ranging from 0 to 100, the variables are built based on various indicators – namely, Government Stability, Socioeconomic Conditions, Investment Profile, Internal Conflict, External Conflict, Corruption, Military in Politics, Religious Tensions, Law and Order, Ethnic Tensions, Democratic Accountability, Bureaucracy Quality – and the lower the rating is, higher the risk, i.e. better countries earn higher ratings.

The interest rates used on the model are know as Selic (*Sistema Especial de Liquidação e Custódia*), which is the main interest rate used in Brazil. The Selic interest rate is the main instrument defined by COPOM (*Comitê de Política Monetária*) and is used to maintain the inflation rates on its target. The present work uses Selic monthly values (% *a.m.*) provided by BCB.

II.3.2 METHODOLOGY

This work follows in the spirit of Moro et al. (2020), de Mattos et al. (2007) and Peres and Yamada (2014) and applies a multivariate time-series model to analyze the determinants of Brazilian FDI inflows. Although both models can be seen on full extent in Enders (2014) we briefly present the Vector Autoregressive (VAR) and Vector Error Correction (VEC) models.

II.3.2.1 Vector Autoregressive Model

On VAR models, there are multiple variables that are affected by their present and past values, since the model's main goal is to describe the interrelationship among variables. The following example of a bivariate model can be seen on Enders (2014):

$$y_t = b_{10} - b_{12} z_t + \gamma_{11} y_{t-1} + \gamma_{12} z_{t-1} + \epsilon_{yt} \tag{II.3.1}$$

$$z_t = b_{20} - b_{21} y_t + \gamma_{21} y_{t-1} + \gamma_{22} z_{t-1} + \epsilon_{zt} \tag{II.3.2}$$

As it can be seen, on equations II.3.1 and II.3.2 (also know as structural VAR), the current value of y is affected by the current value of z while the current z is also affected by y and both are affected by their past values. Both y_t and z_t are assumed to be stationary and ϵ_{yt} and ϵ_{zt} are uncorrelated white-noise errors. The VAR model can also be written in the matrix form, which transforms it into the following:

$$\begin{bmatrix} 1 & b_{12} \\ b_{21} & 1 \end{bmatrix} \begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} b_{10} \\ b_{20} \end{bmatrix} + \begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix} \begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} \epsilon_{yt} \\ \epsilon_{zt} \end{bmatrix} \tag{II.3.3}$$

Which can be written on a more concisely form:

$$\beta_0 \Lambda_t = \beta_1 + \beta_2 \Lambda_{t-1} + \mu_t \tag{II.3.4}$$

The matrix II.3.3 can be developed to the standard form of VAR:

$$y_t = a_{10} + a_{11} y_{t-1} + a_{12} z_{t-1} + e_{1t} \tag{II.3.5}$$

$$z_t = a_{20} + a_{21} y_{t-1} + a_{22} z_{t-1} + e_{2t} \tag{II.3.6}$$

Since that are no contemporaneous terms on the right-hand side of the standard form equations (II.3.5) and (II.3.6), we are able to apply OLS on each one.

II.3.2.2 Vector Error Correction Model

The VEC model appears as a development of the VAR model to be applied when the data presents cointegrating relationships. The cointegration, as presented by Engle and Granger (1987), occurs when the non-stationary variables – integrated of the same order – have a possible linear combination that is stationary and suggests that the variables have a long-run relationship[2].

We can illustrate the VEC model in a matrix representation, as shown below:

$$\begin{bmatrix} \Delta y_{1t} \\ \Delta y_{2t} \end{bmatrix} = \begin{bmatrix} \beta_{10} \\ \beta_{20} \end{bmatrix} + \begin{bmatrix} \pi_{11} & \pi_{12} \\ \pi_{21} & \pi_{22} \end{bmatrix} \begin{bmatrix} y_{1t-1} \\ y_{2t-1} \end{bmatrix} + \begin{bmatrix} u_{1t} \\ u_{2t} \end{bmatrix} \tag{II.3.7}$$

or:

$$\Delta Y_t = \beta_0 + \pi Y_{t-1} + u_t \tag{II.3.8}$$

The following example can also be seen on Enders (2014), where two cointegrated variables are illustrated:

[2]When cointegration occurs between process of different orders, it is called Multicointegration, see Granger and Lee (1990)

$$\Delta r_{St} = a_{10} + \alpha_S(r_{Lt-1} - \beta r_{St-1}) + \sum a_{11}(i)\Delta r_{St-i} + \sum a_{12}(i)\Delta r_{Lt-i} + \varepsilon_{St} \tag{II.3.9}$$

$$\Delta r_{Lt} = a_{20} - \alpha_L(r_{Lt-1} - \beta r_{St-1}) + \sum a_{21}(i)\Delta r_{St-i} + \sum a_{22}(i)\Delta r_{Lt-i} + \varepsilon_{Lt} \tag{II.3.10}$$

Where ε_{St}, ε_{Lt}, Δr_{St-i} and Δr_{St-i} are stationary terms and $\alpha_S(r_{Lt-1} - \beta r_{St-1})$ and $-\alpha_L(r_{Lt-1} - \beta r_{St-1})$ are the error correction terms which augments the first differences. The coefficients α_S and α_L are interpreted as the speed of adjustment, i.e. it illustrates the response of the x_{St} to the deviations from the long-run equilibrium from past periods.

Lastly, this study develops the Impulse Response Functions and the Variance decompositions. Furthermore, these impulse response functions are also estimated by the Local Projections method as a robustness check, since its results are robust to misspecification of the data generating process (Jordà, 2005).

II.4 RESULTS DISCUSSION

On the present section, the steps applied to the data to estimate the model using the methodology – VAR or VEC – and its results are displayed. The following model – inspired by works such as Uddin et al. (2019) and Cantah et al. (2016) – is proposed:

$$
\begin{aligned}
lnIFDI_t = & \sum_{i=1}^{j} lnIFDI_{t-i} + \sum_{i=1}^{j} lnGDP_{t-i} + \sum_{i=1}^{j} lnPRR_{t-i} \\
& + \sum_{i=1}^{j} lnTO_{t-i} + \sum_{i=1}^{j} lnSelic_{t-i} + \sum_{i=1}^{j} lnRER_{t-i} + \varepsilon_t
\end{aligned}
\tag{II.4.1}
$$

Where j is the optimum lag selected.

The variables shown on table II.4.1 are described bellow:

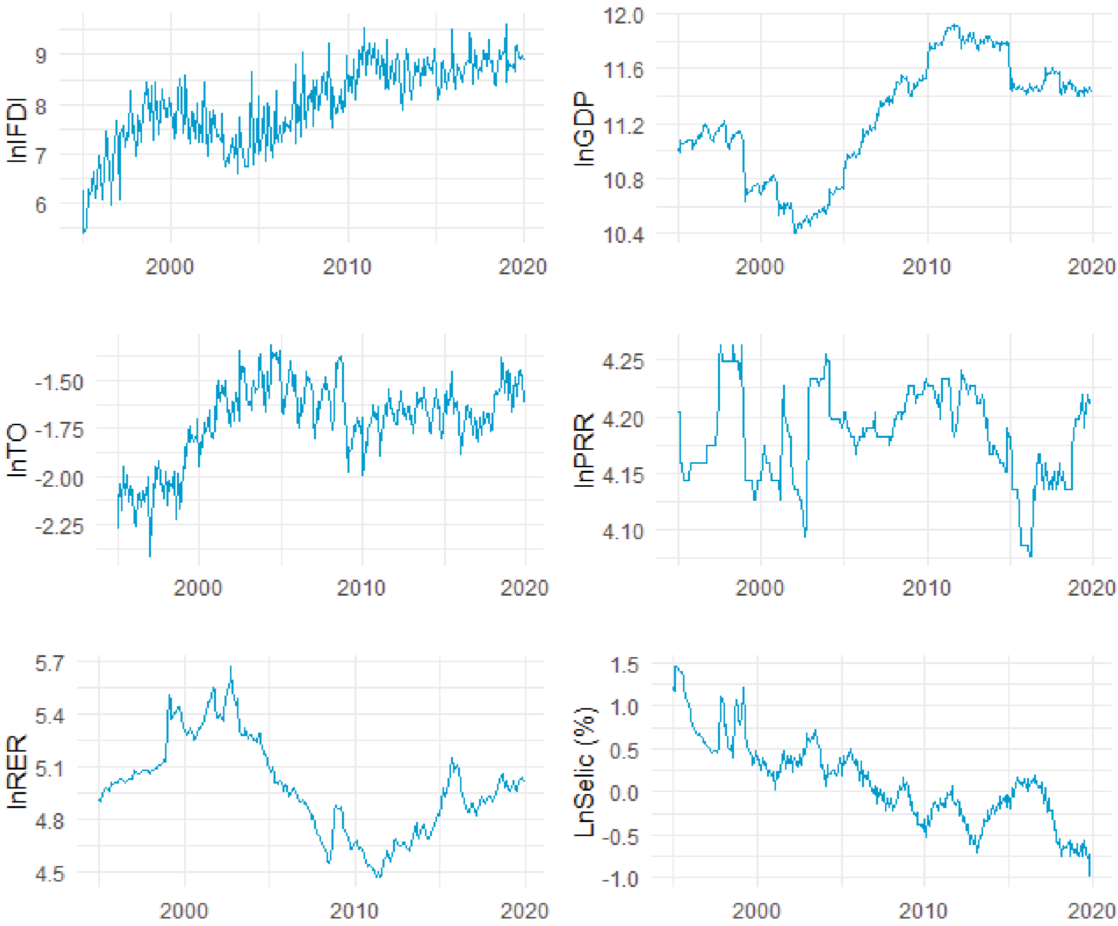
- $lnIFDI$: Represents the natural logarithm of the Brazilian Inward Foreign Direct Investments on US$ millions.
- $lnGDP$: Represents the natural logarithm of the Brazilian Gross Domestic Product also on US$ millions.
- $lnPRR$: Represents the natural logarithm of the Political Risk Rating.
- $lnTO$: Represents the natural logarithm of the trade openness rate, calculated as the sum of exports and imports divided by the gross domestic product.
- $lnSelic$: Represents the natural logarithm of the Brazilian interest rate.
- $lnRER$: Represents the natural logarithm real exchange rate (RER).

Values for $IFDI$, GDP, Exports and Imports – which were used to calculate the trade openness (TO) – were deflated using the monthly Consumer Price Index (CPI), provided by the U.S. Bureau of labor statistics, at current prices of January 1995.

First and foremost, when working with time series data, it is crucial to determine if the variables are stationary or non-stationary. Stationarity can be analysed by a series of unit root tests, such as the Augmented Dickey-Fuller (ADF), Phillips-Perron and Kwiatkowski–Phillips–Schmidt–Shin (KPSS), but a preliminary analysis can be performed through observation of the variable series' plots (Said and Dickey, 1984; Perron, 1988; Kwiatkowski et al., 1992).

Based on figure II.4.1, it is suggested that the data does not represent stationary variables, since none of the plots seems to display the required characteristics of an $I(0)$ variable, i.e. mean and variance are constant while covariance depends only on $t_i - t_j$ (Hoffmann, 2016).

Figure II.4.1: Variables series (on natural logarithm)



Source: Author's own elaboration based on BCB, IPEA, Comex Stat and ICRG data.

Table II.4.1: Descriptive statistics

Variables	$Min.$	$1^{st}Quartile$	$Median$	$Mean$	$3^{rd}Quartile$	$Max.$
$IFDI$	219.9	1647.4	3296.8	4024.5	5868.7	15096.4
GDP	32929	57191	84792	82972	101460	150848
TO	0.08967	0.16551	0.18758	0.18486	0.20815	0.26765
$PolRisk$	59	63.5	65.5	65.67	68	71
$Selic$	0.370	0.820	1.110	1.278	1.530	4.260
RER	87.01	117.95	145.49	151.19	167.87	289.40

Observations: 300
Note: Monetary values on US$ millions
Source: Author's own elaboration based on BCB, IPEA, Comex Stat and ICRG data.

Proceeding with the analysis, the formal ADF, PP and KPSS tests are applied to verify if the variables are, in fact, non-stationary. Both Augmented Dickey-Fuller and the Phillip-Perron tests the null hypothesis (H_0) that the series indeed have an unit root, meaning that it isn't stationary, while the Kwiatkowski–Phillips–Schmidt–Shin test for the null hypothesis that the time series are stationary.

As presented on table II.4.2, on levels the variables weren't able to reject H_0 at 1% on ADF test while reject H_0 on KPSS. The PP test generated mixed results, rejecting H_0 for the variables $lnIFDI$, $lnTO$ and $lnSelic$ while rejecting H_a for $lnGDP$, $lnPRR$ and $lnRER$. Although not rejecting H_0 at 1% on KPSS test, it was able to reject it at 10%, pointing that $lnPRR$ is, indeed, non-stationary, as confirmed by the test on the first differences.

As presented on the tables II.4.2 and II.4.3, the unit root tests point to the non-stationarity of the variables, confirming the previous intuitive analysis based on figure II.4.1. Table II.4.3 shows the results for the tests on the variables on first difference and confirms that the variables are $I(1)$.

Table II.4.2: Unit root tests - Levels

Variable	Lags	ADF p-value	PP p-value	KPSS p-value
$lnIFDI$	5	0.0451	0.01	0.01
$lnGDP$	5	0.8145	0.8961	0.01
$lnPRR$	5	0.0597	0.0349	0.09546
$lnTO$	5	0.2165	0.01	0.01
$lnRER$	5	0.6476	0.7873	0.01
$lnSelic$	5	0.0170	0.01	0.01

Source: Author's own elaboration.

Table II.4.3: Unit root tests - First differences

Variable	Lags	ADF p-value	PP p-value	KPSS p-value
$lnIFDI$	5	0.01	0.01	0.1
$lnGDP$	5	0.01	0.01	0.1
$lnPRR$	5	0.01	0.01	0.1
$lnTO$	5	0.01	0.01	0.1
$lnRER$	5	0.01	0.01	0.1
$lnSelic$	5	0.01	0.01	0.1

Source: Author's own elaboration.

The next step, when working on time-series data, is to determine the optimal lag length of the endogenous variables. The procedure for this work is done through several tests: Akaike Information Criterion (AIC), Hannah-Quinn Information Criterion (HQC), Schwarz Criterion (SC) and Final Prediction Error Criterion (FPE) (Akaike, 1969, 1971, 1974; Hannan and Quinn, 1979; Schwarz, 1978). These tests are run on three scenarios, considering a drift term, a drift and a trend term and, at last, with neither of these terms.

Table II.4.4 presents the tests outcomes for the optimum lag length resulted on the tests[1]. Based on the results from AIC, HQC, FPE and SC, it was decided to work with 4 lags, based on Liew (2004), which shows that HQC and SC have a higher probability of correctly estimate the true lag length on large samples, although AIC and FPE have lower probability of under estimating it.

Table II.4.4: Optimal lag lenght - No Drift or trend

Lags	AIC	HQC	SC	FPE
1	-33.003	-32.482*	-31.702*	4.64e-15
2	-33.119	-32.414	-31.360	4.14e-15
3	-33.202	-32.313	-30.983	3.82e-15
4	-33.362*	-32.289	-30.684	3.26e-15*
5	-33.322	-32.065	-30.186	3.41e-15
6	-33.233	-31.792	-29.638	3.75e-15
7	-33.155	-31.530	-29.100	4.09e-15
8	-33.082	-31.273	-28.568	4.44e-15
9	-33.038	-31.045	-28.065	4.70e-15
10	-33.058	-30.881	-27.626	4.68e-15
11	-32.920	-30.559	-27.029	5.47e-15
12	-32.934	-30.389	-26.585	5.50e-15

* *represents the optimum lag.*
Source: Author's own elaboration.

Following the determination of optimal lag length, the Johansen cointegration test is applied so it is possible to verify the existence of cointegration on the variables data, thus, deciding if the fittest model to be employed will be a VAR or a VEC (Enders, 2014).

Table II.4.5: Johansen test - No drift or trend

	Trace statistic				Eigenvalue statistic			
H_0	test	10%	5%	1%	test	10%	5%	1%
$r = 0$	544.69	85.18	90.39	104.20	148.81	36.25	39.43	44.59
$r \leq 1$	395.88	66.49	70.60	78.87	109.02	30.84	33.32	38.78
$r \leq 2$	286.86	45.23	48.28	55.43	90.77	24.78	27.14	32.14
$r \leq 3$	196.09	28.71	31.52	37.22	85.51	18.90	21.07	25.75
$r \leq 4$	110.58	15.66	17.95	23.52	61.65	12.91	14.90	19.19
$r \leq 5$	48.93	6.50	8.18	11.65	48.93	6.50	8.18	11.65

Source: Author's own elaboration.

According to table II.4.5[2], the cointegration test results for both trace and eigenvalue statistics shows that the null hypothesis is rejected at 1% for all r – pointing to full rank – meaning that the fittest model is the Vector Autoregression (VAR).

[1]The lag selection tests considering drift and trend terms can be seen on the Appendix A.
[2]Johansen tests for models considering drift or drift and trend terms can be seen on the Appendix A.

Three estimations of the VAR model are made, all of them using the appropriate lag length suggested by the information criterion tests. The first estimation is proceeded with no drift or trend while, on the following, the drift term is added and, on the latter, both drift and trend terms are considered. Aiming to determinate the most parsimonious model, an Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) are run on the three models estimations and, the model with the lowest AIC and BIC results, is selected. According to AIC results the best model is the one that does account only for the drift term, although, BIC points to the model that does not account for drift nor trend results. The analysis proceeds based on the AIC results, considering the drift term. Results on the AIC and BIC tests for the model estimations can be seen below, on table II.4.6.

Table II.4.6: Model selection

Model	AIC	BIC
No drift or trend	-4436.191	-3926.815
Drift	-4440.292	-3909.692
Drift and trend	-4434.161	-3882.337

Source: Author's own elaboration.

Tests for residual serial correlation, ARCH effects, normality of residuals and stability of the model are run and its results are presented on the tables below and on figure II.4.2.

Table II.4.7: Breusch-Godfrey LM test

Lag	Chi-squared	p-value
1	36.64	0.4388
2	73.85	0.4173
3	133.08	0.0511
4	180.94	0.0200

Source: Author's own elaboration.

Based on the Breuch-Godfrey LM test, the results does not reject the null hypothesis – no serial correlation – up to four lags, showing that, at the selected lags which were applied to the models, there is no serial correlation problem on the estimated model.

Table II.4.8: ARCH test

Chi-squared	p-value
5082	0.9804

Source: Author's own elaboration.

Table II.4.9: Jarque-Bera test

Chi-squared	p-value
820.5	0.01

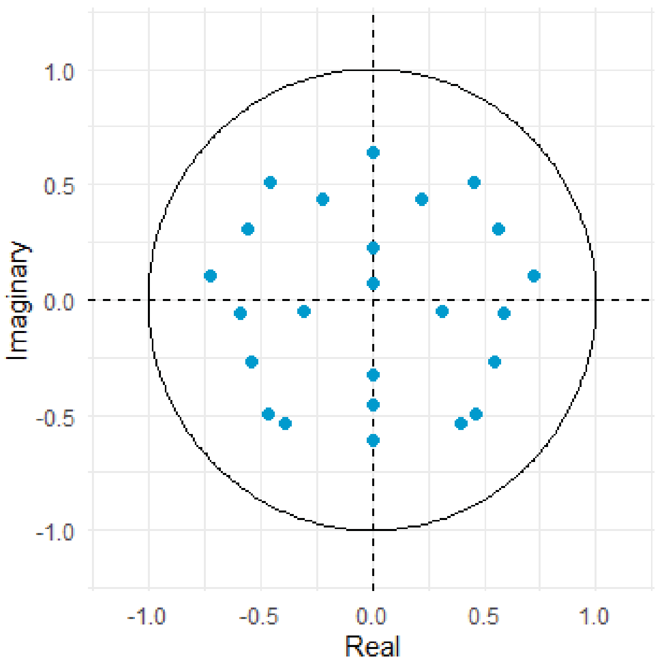
Source: Author's own elaboration.

The ARCH (Auto Regressive Conditional Heteroscedasticity) test (table II.4.8) does no reject the null hypothesis of homoscedasticity, pointing that there is no volatility on the residuals.

Table II.4.9 presents the results for the Jarque-Bera test, which points to a non-normal distribution of the residuals, although, by visualization, it was stated that it has an approximated normal distribution. Even though the test does reject the null hypothesis, it won't present a major problem, since IRFs are based on the variance-covariance matrix, it must simply take a different approach, calculating the standard error of IRFs by bootstrapping.

Then the work proceeds to test the stability of the estimated model through the unit circle, the table with the results for the eigenvalues and its modulus can be seen on Appendix A. As it can be seen on figure II.4.2, all eigenvalues lies within the unit circle, concluding that the model is stable.

Figure II.4.2: Stability test



Source: Author's own elaboration.

Proceeding with the analysis, the figure II.4.3 is presented, which focus only on the impulse response functions on IFDI for the period between January 1995 and December 2019[3].

[3]As a robustness test, Impulse Responses were also estimated by Local Projections, in lines with Jordà (2005), and can be seen on the Appendix A.

The first display (II.4.3a) shows the IFDI shock on IFDI, on the second (II.4.3b), it is displayed the IFDI response to GDP, the third (II.4.3c) presents the response of IFDI to TO, on the fourth (II.4.3d), it can be seen how IFDI reacts to PRR, the fifth graph (II.4.3e) shows the IFDI response from a RER shock and, the last (II.4.3f) shows a shock on Selic. The Impulse Response Functions were estimated for a time period of twelve months to see the shock effects of all variables on the inward foreign direct investment[4].

On figure II.4.3a we see the IFDI response for a SD shock (innovation) from itself, which turns out to be positive at first ($t = 0$), as expected, and moreover it becomes negative on the first lag, tending to gradually become positive until it dies off. The effects of an IFDI shock on itself displays a low persistence throughout the periods, showing that the effect is short-lived.

Figure II.4.3b shows that a shock from real GDP has a small negative impact on IFDI at first, but, on the following periods, it follows the pattern observed on similar studies, causing positive responses, and it can be explained since higher GDP often represents higher productivity and economic development, which in turn attracts new investments to the country. As anticipated, since the system is stable, the impact tends to gradually fade away throughout the periods and dies off on the 12th lag.

Trade openness (II.4.3c), as expected, has a mainly positive impact on IFDI. This result corroborates to the literature which states that higher international trade intensification presents better opportunities for firm development which in turn contributes to attraction of investments for foreign firms onto the economy. The response becomes negative only on lag 4, but then it recovers its positive impact before it vanishes.

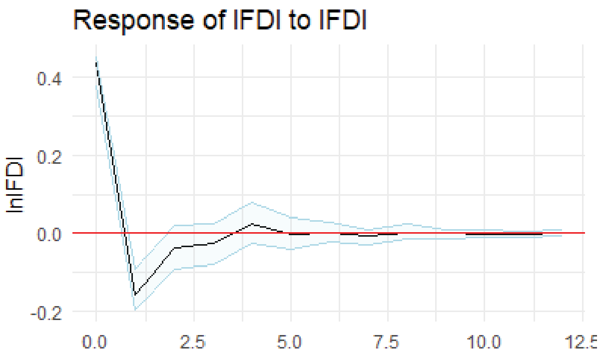
At first, innovations from the Political Risk Rating (PRR) variable displays an erratic result on IFDI, since it presents volatility on the responses throughout the periods before fading out. Although, it has a mainly positive impact, which was expected, since a better institutional environment has a positive effect on the investment decisions made by foreign agents. On previous works, it is presented as a major determinant for IFDI attractiveness, since it displayed significant impacts on FDI flows for various developing and developed countries across Asia, America and Europe, and, for Brazil, the results did not changed.

Real exchange rates and real interest rates ($Selic$) displays the expected impacts on IFDI, since the response of it for their SD shocks are negative and is in accordance with previous literature. It can also be seen that all orthogonalized impulse response functions are within 95% confidence interval and, furthermore, none of the shocks appear to be persistent with permanent positive or negative effects, disappearing before the 12^{th} lag.

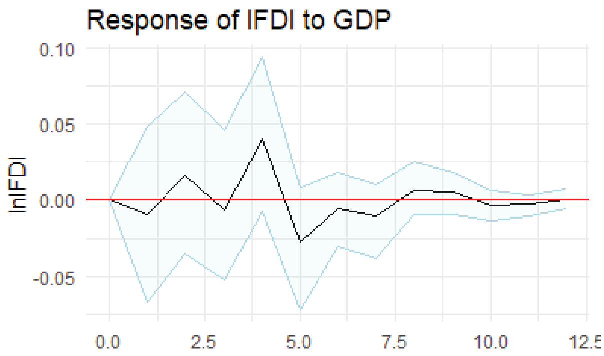
The variance decomposition for IFDI for a 12-month horizon is presented below, on table II.4.10. GDP explains 1.1% of IFDI on the second month, 1.5% on the third and fourth months, 1.9% on fifth month, 2% from the sixth to the ninth and 2.1% from the tenth to the last.

[4]IRFs with cumulated coefficients, for an alternative visualization, can also be seen and are provided on Appendix A.

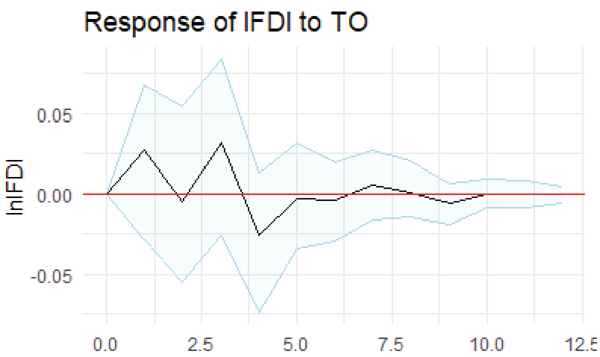
Figure II.4.3: Impulse Response Functions



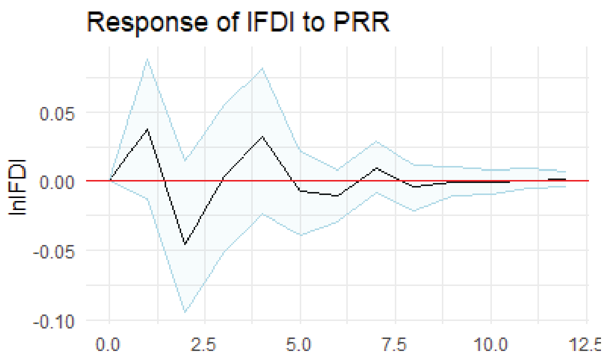
(a)



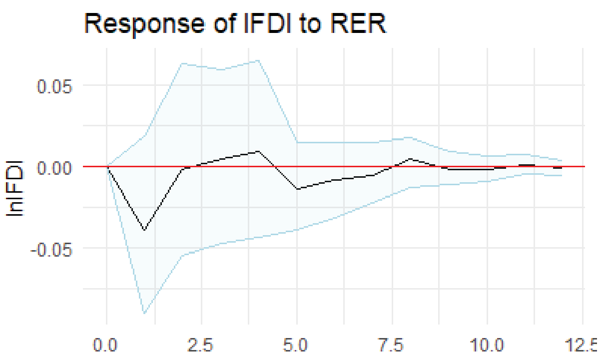
(b)



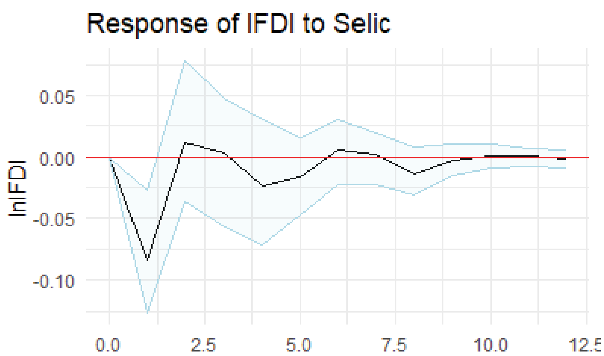
(c)



(d)



(e)



(f)

Source: Author's own elaboration.
Note: The blue area represent the upper and lower bands of the 95% confidence interval.

On the second month, 1% of IFDI can be explained by PRR, 1.4% for the third and fourth months, 1.9% on the fifth month – such as GDP – and 2% on the sixth and seventh months. On the eighth month, PRR explains 2.1% of IFDI, a level that repeats until the twelfth month. It can be seen that GDP and PRR has similar impacts on IFDI during the whole period, suggesting that institutional quality is as crucial as GDP for investment attraction.

Trade Openness has unusual results, since it explains only 0.2% of IFDI on the second month and, on the fourth, it soars up to 2.1%. TO keeps rising its level on the following months, until it reaches its top, where it is able to explain 2.3% of IFDI. This result suggests that increasing the Brazilian economy insertion to international trade could bring fruitful results since it would attract higher inflows of direct investment from foreign firms.

Selic also displays an increasing influence on IFDI, explaining 0.5% on the second month and doubling it on the last five months. RER displays similar results, with increasing influence – such as the previous variables – where it starts explaining 0.8% on the second month, achieves 1.2% by the fourth and reaches its top on the eighth month, where it explains 1.3% of foreign investment inflows.

Table II.4.10: Variance decomposition of IFDI

Month	IFDI	GDP	PRR	TO	Selic	RER
1	1	0	0	0	0	0
2	0.963	0.011	0.010	0.002	0.005	0.008
3	0.947	0.015	0.014	0.007	0.007	0.009
4	0.930	0.015	0.014	0.021	0.007	0.012
5	0.919	0.019	0.019	0.022	0.008	0.012
6	0.917	0.020	0.020	0.022	0.008	0.012
7	0.917	0.020	0.020	0.023	0.009	0.012
8	0.914	0.020	0.021	0.023	0.010	0.013
9	0.914	0.020	0.021	0.023	0.010	0.013
10	0.913	0.021	0.021	0.023	0.010	0.013
11	0.913	0.021	0.021	0.023	0.010	0.013
12	0.913	0.021	0.021	0.023	0.010	0.013

Source: Author's own elaboration.

At last, the presented results from both the Impulse Response functions and Variance decomposition for IFDI corroborates with previous studies, where the approached variables has meaningful impacts on country's FDI attraction, that is, increasing gross domestic product, improving institutional quality and expanding insertion to international trade appears to have greater positive results while, on the contrary, higher exchange and interest rates could bring smaller, but negative, results.

II.5 CONCLUSIONS

On this first essay, the study focusses on the analysis of the main Brazilian Inward Foreign Direct Investment determinants, using monthly data for the period between Jan-1995 and Dec-2019. Using a widely known and reliable dataset, the work adds a variable that captures the Brazilian institutional quality, which was previously perceived as significant to FDI by previous literature.

The present work relies on multiple time series analysis and, through the Johansen test, determined that the vector autoregressive model (VAR) was the fittest to inspect the effects of Brazilian pull (domestic) factors, such as real Gross Domestic Product (GDP), Trade Openness, Real Exchange Rate and Interest Rate represented by Selic rate on IFDI, while also adds on with the Political Risk Rating (PRR).

The responses of IFDI for shocks from itself and the variables GDP, TO, RER and Selic followed the same patterns evidenced by previous works, where the first three affect IFDI positively while the last two presented negative impacts on it. Additionally, the work adds to the literature presenting the response of IFDI due to institutional shocks, since we do not detect it on the researched literature.

Following, the analysis also presents a variance decomposition for IFDI. Its results suggest that TO, GDP and PRR generate the higher impacts, where trade openness explains the most of IFDI on the twelfth month when compared to other variables, such as GDP and PRR, that displays similar results, and followed by RER and Selic.

Furthermore, the results suggest that the impact of institutional quality on Brazil investment attractiveness follows the expected results, since it is similar to previous works made for other countries. The results show that an increase on the Political Risk Rating (PRR) (i.e. an increase on institutional quality) have a positive impact on IFDI, suggesting that higher institutional quality has effects on an agents' investment decision, making it more likely to occur.

Lastly, as pointed previously on this study, FDI attraction is a crucial engine to a country economic development process, suggesting that maintaining and/or expanding it should to be a major concern for policy makers. With that in mind, improving institutional quality should be as crucial as increasing real GDP or improving trade openness, after all, foreign MNEs seek to take advantages of a growing market and, with greater institutional quality, they would incur on lesser costs and uncertainties due to low quality bureaucracy, corruption and/or unstable governments.

Part III

On Brazilian Intra-Industry Trade:
The impacts of Foreign Direct Investments and Trade Barriers

III.1 INTRODUCTION

On the 1960s, researchers approached trade and perceived that, contrary to what was expected, specialization based on comparative advantages wasn't the only phenomena to occur, that is, trade between partner countries wasn't solely one-way where a country would export and import distinct goods since two-way trade, where countries exchange similar goods, also appeared, furthermore, these phenomena were called, respectively, Inter-Industry Trade (IET) and Intra-Industry Trade (IIT).

Bilateral trade – also known as Two-Way Trade (TWT) or Intra-Industry Trade (IIT) – rose due to the countries integration on the post-war period and could not be explained by the standard Ricardian and Hecksher-Ohlin models. Further research revealed that it could even be distinguished by the commodity quality, disaggregating IIT between Horizontal Intra-Industry Trade (HIIT) and Vertical Intra-Industry Trade (VIIT), where the former arise when the products have the same quality and differ only in its technical characteristics while the latter differ when the products diverge on its quality (Stiglitz, 1987).

Since then, various studies aimed on this specific trade phenomena, trying to understand its dynamics and behavior, approaching trade for various countries – developed, developing and transition – and periods to do so. As Zhang (2005) stated, this literature can be classified in two, according to their focus: Theoretical and empirical. The former studies aims to understands the emergence and development of IIT while, the latter, focuses on measurement of IIT through different indexes and uncovering its determinants and the extent of their impacts. Our present essay stands on the second group.

Brazil is well known to be a country focused on primary and intermediate exports, being a major player on sectors with relatively low added value goods (e.g. soya beans, pulp of wood, sugarcane, iron ores, corn and frozen beef), meaning that it can incur on a disadvantage when engaging on trade with its partners, specially developed countries, leaning towards a higher IET and, even in the occurrence of IIT, Vertical Intra-Industry Trade shares.

Considering only manufactured goods, Brazil presented a strong position for IIT during 1980s, achieving 40% of total trade, similar to other countries undergoing through industrialization processes, were it was more predominant within industries with higher wage levels and lower tariff barriers (Hidalgo, 1993). During the 1990s, the creation of Mercosur has caused a major improvement on Brazilian IIT indexes, since trade with its member countries increased 44% of total IIT. These results show the importance of decreasing barriers, towards a higher trade liberalization, for Brazilian IIT (Vasconcelos, 2003).

Intra-industry trade has seen a rise in interest from researches, since it has a close relation with multinational enterprises (MNEs) which are linked to FDI. On 2000s, FDI presented a relative high increase when compared to trade. Since higher economic integration occurred, studies pointed out that two-way trade is correlated to two-way FDI, where the expanded international economic relations induced higher foreign investments, which impacted IIT intensity positively . (Egger et al., 2004; Ambroziak, 2016; Petrović and Mirović, 2018).

Protectionism (e.g. commodity duties or Non-Tariff barriers) is widely known to hurt international trade, with negative impacts for both exporting and importing countries (Besedeš and Prusa, 2017; Barattieri et al., 2021). Studies for Brazil are scarce and, as Mazzucco and Bittencourt (2019) points out, it usually focuses on the impacts that Brazilian commodities suffer – specially primary goods – from barriers implemented by its partners.

The main purpose of this essay is to expand the understanding and comprehension on Brazilian Intra-Industry Trade and its types, aggregating to it on how trade barriers (both Trade Tariffs and Non-Tariff Barriers) and foreign direct investments (FDI) can affect Brazilian trade with its partners. Furthermore, this work aims to see how these trade barriers (trade duties, anti-dumping measures and others NTBs) and the investment decisions, made by foreign firms (MNEs), impacts the commodities' quality and trade levels from industries that engages on intra-industrial trade.

This work reaches for these results through the analysis of these variables for the time period between 2000 and 2016. The first step is to separate Total Trade between IET and IIT, then the work follows the established procedure to distinguish the IIT types through commodity quality and, at last, analyze the cited determinants impacts on each one through a gravity equation. A different approach is made, since exports, imports and total trade are taken as the dependent variables, while most works uses the Grubel-Lloyd index instead.

The hypothesis of this research rests on the idea that Inward Foreign Direct Investments (IFDI) can bring positive impacts to Brazilian trade and commodities quality through industry development and technological enhancement, whereas protectionist measures implemented by Brazil can work on the opposite hand, bringing negative effects and being hurtful to both imports and exports, harming the country's insertion on trade as a whole, also impacting technological development, human capital improvement, quality upgrading of goods, increasing costs for both production and trade and/or decreasing population welfare.

The present work is structured as follows: chapter III.2 presents a literature review on IIT, approaching its disaggregation methods, theoretical works and its identified determinants; chapter III.3 presents the data employed and its structures, and the methodology applied; chapter III.4 present the results and, lastly, chapter III.5 concludes.

III.2 LITERATURE REVIEW

On the following sections we present the major works on Intra-Industrial Trade, introducing studies on IIT indexes used to disentangle IIT and their development throughout the years, presenting the core theories behind IIT and its main determinants.

III.2.1 DISENTANGLING INTRA-INDUSTRIAL TRADE

Looking to the European Economic Comunity (EEC), Balassa (1966) work was crucial to start the intra-industry trade (IIT) theory. By proposing the index III.2.1, which is calculated from the ratio between the difference of exports and imports (in absolute value), the author points to the possibility of measuring the degree of trade overlap in a determined industry.

$$B_i = \frac{|X_i - M_i|}{X_i + M_i} \tag{III.2.1}$$

Proposing an alternative index, Grubel and Lloyd (1975) calculated it subtracting the Balassa Index from 1 and, although its core logic remained, the results were more intuitive, since the following index presents the value where 1 would indicate the presence of pure intra-industry trade and a value of 0 would suggest the opposite.

$$GL_i = \frac{(X_i + M_i) - |X_i - M_i|}{X_i + M_i} = 1 - \frac{|X_i - M_i|}{X_i + M_i} \tag{III.2.2}$$

Although the previous indexes remained influential throughout the years, other works proposed alternative approaches with different indexes to measure IIT's dynamic properties. Equation III.2.3, presented by Brülhart (1994), aimed to expand Hamilton and Kniest (1991) work by improving their Marginal Intra-Industry Trade Index to avoid bias incurred from past indices.

$$MIIT = 1 - \frac{|(X_t - X_{t-n}) - (M_t - M_{t-n})|}{|X_t - X_{t-n}| + |M_t - M_{t-n}|} = 1 - \frac{|\Delta X - \Delta M|}{|\Delta X| + |\Delta M|} \tag{III.2.3}$$

To this day, the Grubel-Lloyd index remains highly predominant, being cited and used in a vast array of researches on IIT. Greenaway et al. (1995), on their work for the United Kingdom trade, used the GL index to decompose and disentangle the intra-industry trade. Posteriorly, Fontagné and Freudenberg (1997) and Fontagné et al. (1998) proposed a new method to it, categorizing the trade flows and computing each share on each category of total trade, although it met criticism from works such as Crespo and Fontoura (2004) and Černoša (2007).

III.2.2 THEORIES OF INTRA-INDUSTRIAL TRADE

The literature showed that the new perceived phenomena – Intra-Industry Trade – can take two forms, one taking place when the similar traded goods have differences in its quality and the other when the similar products' qualities are, indeed, similar. Since the classical Hecksher-Ohlin and Ricardian models didn't provided explanation for IIT, new models appeared from that gap.

A method to split intra-industry trade, differentiating by its quality, was presented by Abd-el Rahman (1991), which pointed that Horizontal IIT occurs when goods have similar quality and, contrarily, Vertical IIT takes place when the quality differs within goods traded in the same industry.

To explain the Vertical IIT, works such as Falvey (1981) and Falvey and Kierzkowski (1987) approached the contrast on product qualities – through developments on 2x2x2 Hecksher-Ohlin models – and pointed that it were a result from differences in production factors (i.e. production of high quality goods typically incur on higher costs with capital, while low quality products are produced by relatively labor-abundant countries) and/or income levels.

On a similar strand, the model presented by Flam and Helpman (1987) showed that the vertical differentiation can take place due to differences in technological progress, income, income distribution and population growth, where the North would produce and export new, high quality products, abandoning the old, low quality products, which production and exportation would be taken by the South, generating VIIT.

Contrary to the models cited previously, seminal work conducted by Krugman (1979), Lancaster (1980) and Helpman (1981) sought to explain Horizontal Intra-Industry Trade and, through those new models and theories, they pointed out that this type of trade occurs due to monopolistic competition, incorporating horizontal product differentiation and the consumers preferences for higher product variety. On the supply side, the horizontal product differentiation would arise from scale economies while, on the demand side, the preference for higher variety would be explained by concepts such as "love of variety" and "favorite variety".

While working with data for bilateral trade between Spain and 60 OECD and non-OECD countries over the period 1988-1995, Blanes and Martín (2000) aimed to estimate the impact of FDI on both types of IIT, proposing an enhancement to the method, where the VIIT could be differentiated between High Quality VIIT and Low Quality VIIT.

High Quality VIIT would take place if the rate between the unit values were above the previously set cut-off range, otherwise VIIT would represent low quality if the rate were below the range. This method produces finer analysis, since it allows us to determine if a country is specialized in high or low qualities.

A wider historical overview on IIT and the development of theories, indexes and models can be seen on Andresen (2003).

III.2.3 DETERMINANTS OF IIT

Some literature centered its attention to the determinants of IIT which could be distinguished into country-specific and industry-specific determinants. Country-specific factors responds to variables specific to each country particular traits, such as economic development, geographic localization, market size, economic integration and barriers to trade, while industry-specific responds to market structure, product differentiation, economies of scale, MNEs and product life cycle (Andresen, 2003).

The research undertaken by Greenaway et al. (1995) turned out to be one of the most influential works that approach the determinants of IIT. On their work for United Kingdom, the authors used a set of industry-specific determinants – such as horizontal product differentiation, market structure competitiveness, scale economies and multinational enterprises – to estimate separated equations for both VIIT and HIIT instead of a single one for total IIT.

The disaggregation of intra-industry trade was based on previous hypothesis, since theory suggested that their determinants should differ and a single estimation for aggregated IIT could generate misleading results. The results for the disaggregated IIT were robust, pointing that VIIT and HIIT levels are related to production and industrial structure traits, although not in the same way [1].

Regarding country-specific determinants, some works points out to the relevance of variables such as market size, capital-labor ratio, transport costs, trade restrictions, common borders, common languages or FTAs. Helpman (1981) provided evidence that the intra-industry trade will respond positively to lower differences on capital to labor ratio (proxied by per capita income) and the market size (usually proxied by GDP).

Analysing the IIT between U.S. and 38 countries, Balassa and Bauwens (1987) estimate a set of determinants and produce highly significant results. Country-specific variables present the expected outcomes, where average per capita income, average country size, trade orientation, dummies for FTAs, common language and common border are positively correlated to IIT while, on the other hand, differences on income and country size, and distance have a negative correlation.

Whilst focusing on specific country variables, the authors also attend to industry-specific ones and, among the traits considered, product differentiation and marketing present the expected positive sign while economies of scale, industrial concentration, FDI and tariff dispersion – to name a few – presents a negative sign. Even though the empirical evidence are robust for both country- and industry-specific determinants, the former determinants have stronger support than the latter.

[1] Approach on industry-specific determinants can also be seen on works such as Caves (1981) and Clark (1993)

Ekanayake et al. (2007) looked specifically to Intra-Industry Trade between United States and Latin America, and finds that Mexico is the only country that isn't dominated by Inter-Industry Trade (i.e. One-Way Trade). Latin America and US presented an increase on IIT during 1990-2005, but almost all of it had differentiation in quality (VIIT), showing that countries with different income levels presents higher VIIT. Presenting similar results, Durkin and Krygier (2000) chose US as a reference country and also found significance on the results that points out to the positive relationship between GDP per capita and IIT.

Moreover, Ekanayake and Ledgerwood (2008) narrows the U.S. partners, limiting the trade relationships, and look to the Caribbean countries. The work aims to extend the literature on U.S. IIT focusing on these 28 countries (e.g. Aruba, Barbados, Dominican Republic), since the authors claim that most IIT works are focused on European trade.

Using detailed trade data at the 10-digit HS for the period 1990-2005 to disentangle IIT, the research points that IIT between U.S. and its Caribbean partners became stronger, although, most of its increase is due to VIIT instead of HIIT. Country-specific determinants such as per capita income and trade intensity are found to have a positive impact on the types of IIT, albeit difference in per capita income, distance, differences on factor endowment and trade imbalances affect it negatively. IIT presented a positive response for industry-specific determinants such as industry size and vertical product differentiation, among others, while had a negative response for industry concentration.

Since the EU is the major partner of Western Balkan countries, Botrić (2013) uses data on bilateral trade between these countries (i.e. Albania, Bosnia and Herzegovina, Croatia, Former Yugoslavia, Kosovo, and Serbia and Montenegro) and the 15 oldest Members of EU, aiming to understand the integration process impacts on trade. Using methods previously cited, the author distinguish trade into Inter-Industry Trade and Intra-Industry Trade and, moreover, IIT on HIIT and VIIT, thus verifying that the share of IIT is relatively low – in some cases even negligible – even when compared with other countries in transition.

The author proceeds to estimate three equations and, for all the estimations, the results are significant and according to expected, were distance, relative time and cost to export and GDP per capita have a negative impact while borders, gross fixed capital and employment impacts IIT positively.

Turning to Asian countries, China's FDI attraction and fast IIT development with its two main trade partners – United States and Japan – got the attention of Xing (2007). China attracted FDI through low cost labour but avoided the specialization on low-quality commodities, focusing on the expansion of high-tech goods – e.g. in 2002 China exported \$67 billion on high-tech products and more than doubled it in the following two years, reaching \$166 billion on high-tech exports – which led to an increase on IIT shares. Due to the economic integration between China and Japan – where FDI played a crucial role, specially on automotive industries – its intra-industry trade grew substantially, jumping from 18% on 1992 to 34% on 2004. On a smaller scale, IIT between China and US also grew, reaching 9% on 2004 (Xing, 2007).

FDI has been proved to be a major determinant of intra-industry trade, Hu and Ma (1999), for example, studied the bilateral trade of China with other 45 countries and found that inflows of FDI and the vertical IIT have a positive relationship, although the impact of FDI on IIT highly depends on characteristics of FDI – i.e. vertical or horizontal FDI (Xing, 2007).

Also on East Asia, Fukao et al. (2003) analyses the Japanese electrical machinery industry and shown that the cost of FDI impacts the IIT type, since small costs encourage multinational firms to exploit the factors with lower prices, fragmenting the production process and, in consequence, raising the Vertical IIT share.

As literature points out, firms face high trade costs when engage on international markets, since it needs to ensure that a good reaches its final foreign consumer. Trade costs can be dismantled on various categories, like transportation costs (such as freight, insurance or "iceberg costs"), tariffs, information costs, regulatory agencies, monetary costs, retail costs and so on. Fukao et al. (2003) also points that trade costs have influence on the FDI type, since high trade costs induce the MNEs to avoid exports and focus on local production (i.e. horizontal FDI), which impacts the share of VIIT.

Previous works showed that tariff barriers are high on developing countries while, on the other hand, on developed countries they have lower levels and can even reach 0% on particular cases. Tariffs barriers are heterogeneous across goods while, on the other hand, NTBs do not affect all sectors, concentrated on a small number of them, and are more restrictive (Anderson and van Wincoop, 2004).

As pointed out by IMF (2017), protectionism has been rising around the globe and it can cause severe damage to trade, impacting global economic development, with that being said, countries can benefit from policies that aims to diminish trade barriers. Gathering data on 16 OECD countries, Baier and Bergstrand (2001) show us that tariff barriers are a key instrument that must be understood, since 23% to 26% of the trade growth can be explained by the tariff reductions, while the declining of transport related costs explain only a third of it.

Analysing 152 country pairs for the 5 years period – 2010 to 2015 – Kinzius et al. (2019) provides empirical evidence that NTBs such as import control or subsidies are notably harmful to trade, since they can be responsible for 2-8% and 17% of trade reduction respectively, and can be hard to be detected due to its complexity and heterogeneity throughout the sectors (Miranda, 2001).

On the 1980s Brazil presented an increasing IIT, specially with developed countries and some main partners on Latin America. From this scenario, Hidalgo (1993) approached Brazilian trade to identify the manufactured goods that engages on IIT and, moreover, identify its main determinants.

Using data with FOB values for 1978-1987, it was perceived that IIT represented between 30% to 40% of total trade for the analysed manufactured goods and, through cross-section analysis, the work pointed that market size, GDP per capita and difference between GDP per capita explain this trade type, implying that economic development can increase IIT. The author also suggests that a reduction on tariff barriers should impact IIT, increasing its level.

In the 2000s, international trade rose with an intense increase on demand for primary and intermediate products from developing countries. Due to this scenario, Brazil were capable to revert its trade deficit.

Looking to this economic environment, Baltar (2008) approaches Brazilian trade on two periods, 1996-1998 and 2003-2005, examining it by distinguishing between inter- and intra-industry trade. Looking to the data, the author show that the Brazilian trade status changes from a US$ 6.3 bn deficit to a US$ 34.4 bn surplus between periods, where both exports and imports improved. The data presented also confirms the hypothesis that IIT tends to take place on manufacture or intermediate industries, where the production tends to be capital-intensive, with higher technology and R&D.

The analysis shows that the Brazilian trade is mainly one-way, exporting primary, intermediate goods and manufactured goods with low technology to developing countries and importing manufactured goods with high technology from developed countries and, in the few cases when intra-industry occurs, the vertical trade with low quality dominates. The author points that, although IIT is predominantly inferior, it still presents itself as an opportunity for development if the correct investments – mainly focused on infrastructure and industrial development – are made.

Carmo and Bittencourt (2013) looks to the IIT levels with OECD countries between 2000-2009, decomposing it to analyse its determinants. The authors found that, in all bilateral relations, VIIT surpass HIIT. They also find that U.S., Germany and Mexico had the highest levels of IIT with Brazil.

These authors, using HS-6 disaggregated data, distinguish Vertical IIT between High Quality VIIT and Low Quality VIIT and, from this separation, it was possible to show that Brazil were a net exporter of low quality products. It was also found that the average GL index were 0.12, pointing that, on bilateral trade for Brazil-OECD, inter-industry dominates intra-industry. Then the work proceeds with the estimation – that where made through Panel Data – building itself on Falvey and Kierzkowski (1987) theory. The displayed results for GDP, distance and difference on factor endowment were robust and the presented estimated coefficients had the expected effects, suggesting that the latter had a positive impact on VIIT.

According to Hubbard et al. (2014), Brazil – which is the largest exporter of agri-food products to the EU – has a dominant inter-industry relationship with European countries. Analysing nearly 800 products through Fontagné and Freundenberg methodology, the authors found that, although IIT for agri-food goods remains fairly unchanging, total IIT participation had fallen between 2000 to 2012 (from 25.7% to 19.2%), probably due to the increasing importance on non-agri-food goods. Moreover, the majority of IIT on agri-food goods is classified as vertical (i.e. 98%), pointing to differences on quality between traded goods.

The authors concludes that the trade patterns between Brazil and EU is similar to the classical "North-South" scenario, where Brazil (i.e. South) exports mainly primary agricultural goods with low aggregated value while EU (i.e. North), on the other hand, is specialized on non-agricultural goods, with high aggregated value. All things considered, the work concludes suggesting that a trade liberalization could be fruitful, since both partners would benefit from greater trade flows.

III.3 METHODOLOGY AND DATA

On the next two sections we present the data, describing its details and sources, and afterwards we unfold the selected methodology, explaining its steps and how it will be used to generate the empirical results.

III.3.1 DATA

As this study aim to examine the bilateral trade between Brazil and its partners, we target variables pointed as crucial for the gravity model by relevant literature, working on the period 2000-2016 with annual databases for the ones which were selected.

For Exports and Imports, this study works with the data provided by *COMEX STAT*, a system built to extract data from *SISCOMEX (Sistemas de Comércio Exterior)* currently provided by the *Ministério da Economia*. From *COMEX STAT* the study is able to gather the value in US$ (FOB) and the net weight (on kilogram) traded with 262 partners for the whole period. Both exports and imports data for the whole period are disaggregated on the 2017 Nomenclature edition of Harmonized Commodity Description and Coding Systems at the sixth digit level (HS-6)[1], administrated by World Customs Organization (WCO), providing extremely specific data for 6308 different products. This level of disaggregation is applied with the purpose of avoiding any intra-industry bias on the analysis, such as the one pointed out by Lipsey (1976).

For geographical distance and frontiers, the study employ the dataset GeoDist – which is extensively used on similar works that employ gravity equations – provided by CEPII (*Centre d'études prospectives et d'informations internationales*). The dataset provides a vast array of information which are usually applied to social sciences researches. Presenting bilateral data for variables such as distance, contiguity or colonial historical links, GeoDist proves to be a useful tool to estimate the model. The study employ the weighted distance – which consider the principal cities on each country to measure the distance – and the contiguity, which corresponds to frontiers between two countries. More details over the variables can be seen on Mayer and Zignago (2005) work.

For Tariff and Non-Tariff Barriers, the present work uses the data provided by the World Trade Organization (WTO-DATA). Tariffs barriers are based on the Most Favoured Nation (MFN) applied (not bound) by the reporting country, aggregated by HS-6 level, and the measure is a simple average of ad valorem duty rates.

Non-Tariff Barriers stands for Anti-dumping (ADP), Countervailing (CVD), Safeguards (SG), Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT) measures[2]. ADP,

[1]Details can be seen on *Notas Explicativas do Sistema Harmonizado de Designação e de Codificação de Mercadorias* (Nesh).

[2]Details on the database variables can be seen on WTO data technical notes available on its website.

CVD and SG show the total number of final measures implemented, while SPS and TBT show the total notifications of introduced or modified measures, all of them reported by Brazil to WTO during the period 2000-2016.

Anti-dumping are measures that focus on preventing that a foreign product enters on domestic markets with prices below its normal value or production costs (i.e. Dumping), aiming to protect local businesses from unfair predatory strategies. Anti-dumping measures usually consists on a series of complex analytical steps to define the normal price on the partner country and the export price, applied on the domestic market, and compare both.

Countervailing is an action taken by the importing country to counterbalance subsidies made by an exporting country. Usually, when an importing country identifies a subsidy on goods from a exporting partner, it can request for the subsidy's withdraw or apply an increase on importing duties to reverse the damage made. The latter option receives the name of "countervailing duties" and, according to the Agreement on Subsidies and Countervailing Measures, must be notified to WTO when implemented.

Aiming to temporarily protect a specific domestic industry from foreign products that could potentially bring harm to it, a country can implement a Safeguard measure that, although rarely used by governments which usually prefer other protection strategies, allows an import restriction of these products.

Countries usually have regulations and standards that should be met if a product aims to enter on domestic market, nonetheless, sanitary and phytosanitary measures and technical barriers to trade represent these standards. Sanitary and phytosanitary standards aims to secure the appropriate quality that ensure the humans, animals and plants health by preventing diseases and/or pests. Basic rules for this kind of barrier are set by the Sanitary and Phytosanitary Measures Agreement, that aims to avoid disguised protectionism by allowing that countries set their standards provided that it is based on science, without discrimination by countries.

The technical barriers also represents the minimum standards and regulations that should be met by foreign products, in order to guarantee consumers and environmental safety and protection. According to WTO, TBT should not be used to discriminate countries, must be fair and equitable and should avoid unfair advantages to domestic firms.

Due to variation of regulations and standards among countries, it is a variable difficult to be measured, although implementations or modifications of those must be reported to WTO which encourages the adoption of international standards.

As presented earlier, all of the NTBs mentioned above must be notified to the WTO according to its agreements, avoiding protectionism measures in order to ensure a healthy and fair trade environment.

The data used for GDP for Brazil and its partners are extracted from the World Development Indicators (WDI), a database built and updated by the World Bank. The data supplies all values on 2015 US$ constant prices for all countries throughout the whole period.

The data for the last variable is provided by the BCB (*Banco Central do Brasil*). The database for the annual IFDI we apply to this work is provided specifically by its statistical department or BCB-Dstat (*Banco Central do Brasil - Departamento de Estatísticas*), published on the Balance of Payments – according to BPM6 – on US$ millions which is available to download at its website.

Table III.3.1: Descriptive statistics

Variables	$Min.$	$Mean$	$Max.$	$S.D.$
X	0	0.9	18675	36
M	0	0.7	6622	16
GDP_{BR}	1,186,420	1,590,629	1,868,465	232,689
$GDP_{partner}$	1	1,306,683	19,974,534	3,176,019
$Dist$	1,344.7	8,606.3	18,523.4	4,598.7
ADP	0	12.1	32	9.3
CVD	0	0.2	1	0.4
SG	0	0.04	1	0.2
SPS	1	78.6	147	45.4
TBT	12	47.6	98	20.3
$Duty$	0	14.8	55	7.1
$IFDI$	17,976	63,491	105,602	30,244

Observations: 2,499,576
Note: Monetary values on US$ millions.

III.3.2 METHODOLOGY

For the research analysis, this study support its model on previous works, such as Fontagné et al. (1997), Greenaway et al. (1995) and Fukao et al. (2003). The 15% and 25% thresholds (γ) are used to identify if there is IET or IIT on the current industry (Abd-el Rahman, 1991; Fontagné et al., 1997), as it can be seen on Table III.3.2.

Table III.3.2: Trade Types

Type of trade	Trade overlap
Inter-Industry Trade (IET)	$\frac{Min(X_i,M_i)}{Max(X_i,M_i)} \leqslant \gamma$
Intra-Industry Trade (IIT)	$\frac{Min(X_i,M_i)}{Max(X_i,M_i)} > \gamma$

Source: Based on Fukao et al. (2003)

Where:

$$IIT_{ijt} = HIIT_{ijt} + VIIT_{ijt} \tag{III.3.1}$$

Since the products' prices can mirror its quality even in the presence of imperfect information, they are used to calculate the Unit Values (UV_i) of each commodity identified as intra-industry trade. The Unit Value corresponds to the value of trade divided by the quantity traded, resulting on an average value for the traded good. Using Unit Values for each product, it is applied a 15% and 25% cut-off (α) to distinguish the type of IIT. The work proceeds to determinate HIIT when it satisfies the following condition (Stiglitz, 1987; Fontagné et al., 2005):

$$1 - \alpha \leqslant \frac{UV^X_{ijt}}{UV^M_{ijt}} \leqslant 1 + \alpha \tag{III.3.2}$$

The vertical IIT occurs when the relation of unit values are outside the determined range. Furthermore, VIIT can also be distinguished according to the products quality of the exporting country, between VIIT with low quality (VIIT-L) and VIIT with high quality (VIIT-H). According to the following conditions, Intra-Industry trade assumes VIIT-L when:

$$\frac{UV^X_{ijt}}{UV^M_{ijt}} < 1 - \alpha \tag{III.3.3}$$

And represents VIIT-H when:

$$1 + \alpha < \frac{UV^X_{ijt}}{UV^M_{ijt}} \tag{III.3.4}$$

Where α represents the cut-off and assumes either 15% or 25%.

After separating the commodities for each pattern – IET, HIIT, VIIT-L or VIIT-H – we focus on IIT and proceed to the estimation. Since the literature implies that the VIIT and HIIT have different determinant impacts, our model takes the following forms:

$$\begin{aligned} HIIT_{ijt} = \alpha + \beta_1 lnGDP_{BR_t} + \beta_2 lnGDP_{it} + \beta_3 lnDist_i + \beta_4 Border_i + \beta_5 ADP_t + \\ \beta_6 CVD_t + \beta_7 SG_t + \beta_8 SPS_t + \beta_9 TBT_t + \beta_{10} Duty_{jt} + \beta_{11} lnIFDI_t + \epsilon_{ijt} \end{aligned} \tag{III.3.5}$$

$$\begin{aligned} VIIT^L_{ijt} = \alpha + \beta_1 lnGDP_{BR_t} + \beta_2 lnGDP_{it} + \beta_3 lnDist_i + \beta_4 Border_i + \beta_5 ADP_t + \\ \beta_6 CVD_t + \beta_7 SG_t + \beta_8 SPS_t + \beta_9 TBT_t + \beta_{10} Duty_{jt} + \beta_{11} lnIFDI_t + \epsilon_{ijt} \end{aligned} \tag{III.3.6}$$

$$\begin{aligned} VIIT^H_{ijt} = \alpha + \beta_1 lnGDP_{BR_t} + \beta_2 lnGDP_{it} + \beta_3 lnDist_i + \beta_4 Border_i + \beta_5 ADP_t + \\ \beta_6 CVD_t + \beta_7 SG_t + \beta_8 SPS_t + \beta_9 TBT_t + \beta_{10} Duty_{jt} + \beta_{11} lnIFDI_t + \epsilon_{ijt} \end{aligned} \tag{III.3.7}$$

Where GDP_{BR_t} stands for Brazilian Gross Domestic Product, GDP_{it} denotes the partner Gross Domestic Product, $Dist_i$ is the distance between Brazil and partner country, $Border_i$ is a dummy variable that assumes 1 when Brazil and its partner shares a common border, ADP_t is the Anti-dumping measures, CVD_t is the Countervailing measures, SG_t responds for the Safeguard measures, SPS_t is the Sanitary and Phytosanitary measures, TBT_t represents the Technical Barriers to Trade, $Duty_{jt}$ are the importing duties applied by Brazil and $IFDI$ is the Brazilian Inward Foreign Direct Investment. The subscripts i, j and t denotes the partner country, the HS-6 commodity and year, respectively.

The models (III.3.5), (III.3.6) and (III.3.7) are estimated through panel data considering three dependent variables on each type of trade, namely, Exports (X), Imports (M) and Total Trade ($X + M$). Each model estimation is made through three different versions: Pooled OLS, Fixed Effects and Random Effects. A simple form of the framework is presented below:

$$y_{it} = \alpha + X'_{it}\beta + \epsilon_{it} \tag{III.3.8}$$

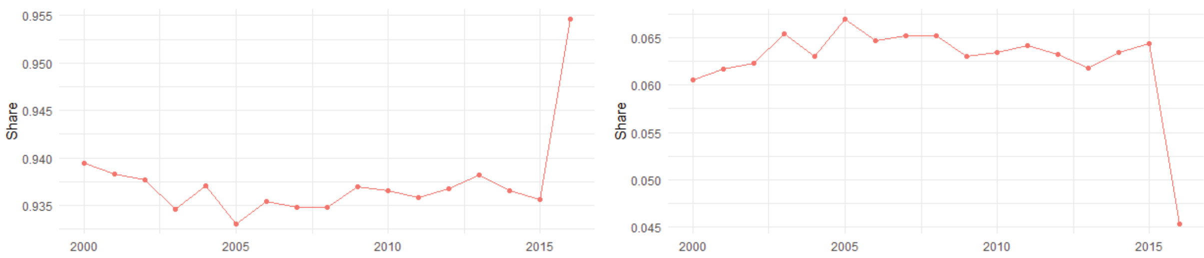
$$\epsilon_{it} = c_i + u_{it} \tag{III.3.9}$$

Where c_i responds to the unobservable individual effect (i.e. heterogeneity) on the data and u_{it} is the remaining error. On Pooled OLS regressions it is assumed that there is no heterogeneity on the data (i.e. same relationship for all the data). The Fixed Effects models considers the heterogeneity and the possible correlation between it (c_i) and the explanatory variables (x_{it}), while the Random Effects considers it uncorrelated with the included variables (Baltagi, 2005). The results are presented on the following session.

III.4 RESULTS DISCUSSION

From the presented methodology, this study produces the following results. The analysis begins by looking to the trade types rate throughout the studied years.

Figure III.4.1: Trade types (2000-2016)

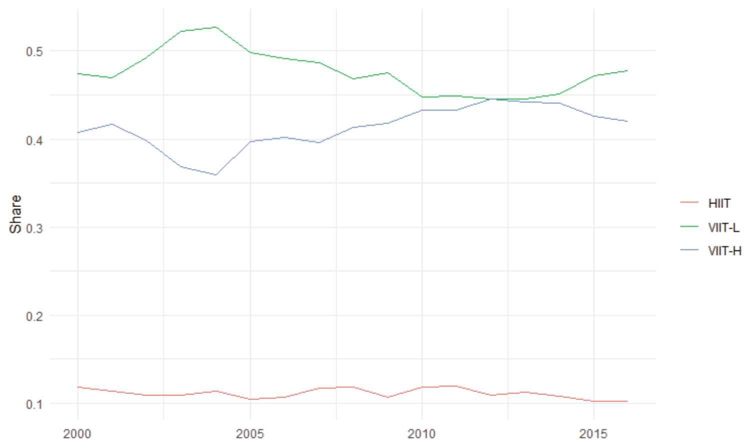


a) Inter-industry trade

b) Intra-industry trade

Source: Author's own elaboration.

Figure III.4.2: Intra-Industry Trade (2000-2016)



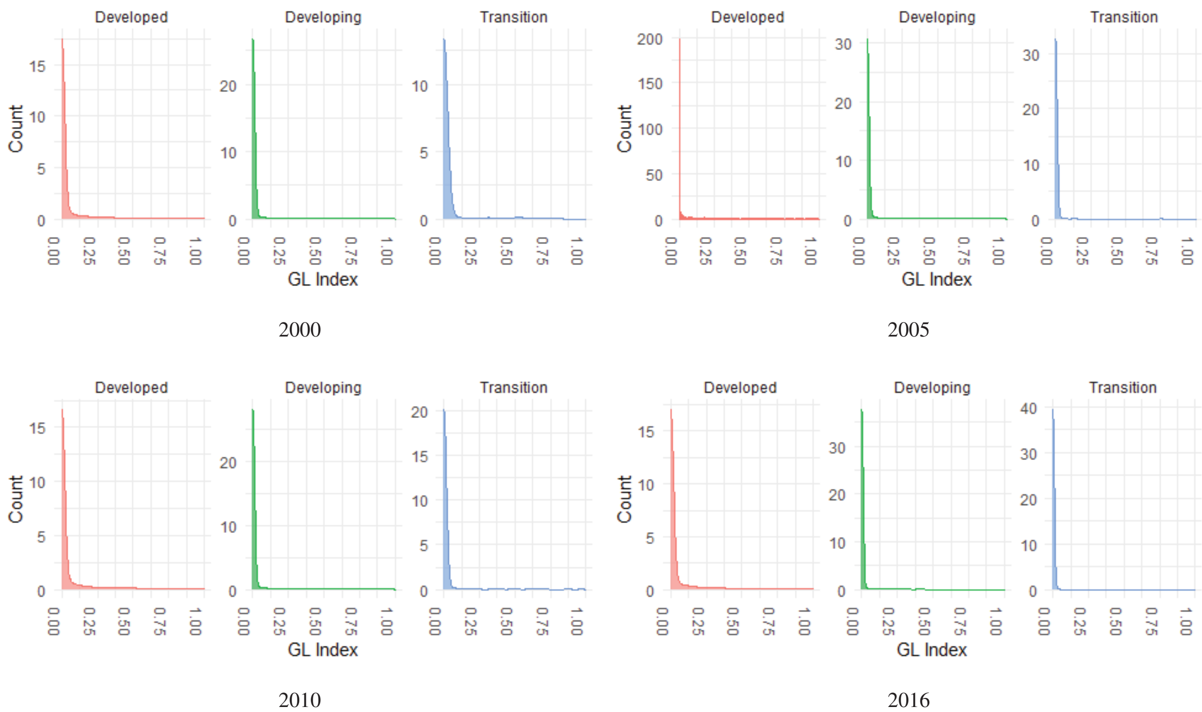
Source: Author's own elaboration.

Figure III.4.1a and Figure III.4.1b uncover the extent of IET's dominating aspect, which was also noted on previous researches for other similar developing countries. The share of IET on Brazilian trade remains stable around 94% of total trade while total IIT corresponds for approximately 6% through the period, until 2016, where IET reaches a high point of 95.4% and IIT follow downwards, reaching 4.5% of total trade.

Looking exclusively to IIT, Figure III.4.2 shows us a tendency of VIIT-L over VIIT-H and HIIT. Vertical IIT for low quality reaches a high point of 52.6% on 2004 while its counterpart for high quality reaches its lowest of 35.9% on the same year, these results reverse until 2012-2013 where both types of Brazilian VIIT appears to have a seemingly negative relationship. The results points to VIIT-L reaching a minimum of 44.5% on 2013 while VIIT-H reaches a maximum of 44.5% on 2012. HIIT remains stable through all time span, fluctuating around 11%, reaching its highest rate of 11.8% (2011) and the lowest of 10.1% (2015).

Proceeding with the analysis, the GL index is applied to expand the results from Figure III.4.1 and visualise the trade patterns across groups of partners countries (i.e. Developed, Developing and Transition countries) for 4 distinct years within the time span. The results can be seen on Figure III.4.3.

Figure III.4.3: Grubel-Lloyd Index by country group



Source: Author's own elaboration.

Figure III.4.3 reinforces the previous analysis where IET is predominant. Although it was expected a higher GL index for developing and transition countries, Brazil presents a lasting pattern of low GL index (i.e. IET, since de index is close to zero) throughout all three groups.

For this work results are generated for all threshold (namely, γ and α) combinations and, although the cut-offs are arbitrary, the analysis is focused only on the results for the narrowest dispersions – $\gamma = 15\%$ and $\alpha = 15\%$ – since Abd-el Rahman (1991), Greenaway et al. (1994) and Greenaway et al. (1995) demonstrate that increasing the dispersion range (15% to 25%) do not generate substantial changes.

Focusing on Intra-Industry, Table III.4.1 shows the ten biggest partners for each IIT type for 2016[1]. It can be seen that Brazilian HIIT appears to be balanced between developed and developing countries, where, for the latter, it happens mostly within South America. The pattern presented on HIIT repeats on VIIT-H, although, as expected, it changes for VIIT-L, where it

[1] Similar tables for Exports and Imports can be seen on Appendix B.

displays a higher predominance of developed countries, with new countries appearing on the list – Denmark and Belgium.

Table III.4.1: Top ten 2016 Partners - Total Trade

HIIT		VIIT-L		VIIT-H	
Argentina	3,093	Argentina	3,846	United States	5,082
United States	1,746	United States	3,562	China	1,074
Germany	265	Germany	682	Argentina	753
France	240	Spain	249	Germany	361
China	105	Denmark	182	France	359
Colombia	77	France	177	Spain	138
Spain	57	China	172	Colombia	123
India	35	Belgium	160	India	117
Chile	30	Colombia	105	Chile	53
Canada	9	Canada	82	Canada	50

Note: Monetary values on US$ millions.
Source: Author's own elaboration

Looking to the data, focusing on the top ten goods engaged on each type of trade for 2016, it is show that, for HIIT, products within Vehicles and parts chapter (HS-2), within Beverages, spirits and vinegar chapter, Mineral fuels and oils, Plastics and Rubber have the highest influence and value. Looking to exports' total value within HIIT, the pattern almost repeats with the addition only to products on HS chapter for Nuclear reactors and appliances and Electrical Machinery and parts. On imports, goods within Nuclear reactors chapter have a higher value (125 US$ millions), compared to exports (81 US$ millions). Vehicles and parts, Mineral fuels and oils, Beverages and spirits and Electrical machinery ans parts also appears on the highest values, with the addition of goods within Pharmaceutical products chapter, that sums 102 US$ millions on value.

Focusing on VIIT-L – where Brazil exports goods with lesser quality – the pattern is less diverse, since the highest values of total trade are focused on HS-6 goods within HS chapters of Vehicles and parts, Nuclear reactors and others, Electrical machinery and parts and Pharmaceutical products. Disaggregating and analysing only exports or imports value, it becomes clear that the group of goods do not change much, mostly maintaining the same goods.

Changing the focus to total trade for VIIT-H the pattern changes, some goods within HS chapter for Nuclear reactors, Plastic and Pharmaceutical still appears on the top ten, although, goods within Aircraft, spacecraft and parts, Optical, photographic and cinematographic instruments and Organic chemicals reaches highest values. Also looking to exports and imports separately, the pattern of goods do not change, when compared to VIIT-L or HIIT. Despite the pattern repeating itself for exports, on imports the goods mentioned on total trade appear – i.e Aircraft, spacecraft and parts, Optical, photographic and cinematographic instruments and Organic chemicals – pointing that, even though Brazil exports have a higher quality on these goods, it is still small in value when compared to goods in HS chapter such as Nuclear reactors, Vehicles or Plastic.

Looking to 2016 alone, Brazil presents itself as a net exporter only on goods classified as VIIT-L (1.300 US$ millions), while on VIIT-H and HIIT it appears as a net importer (400 US$ millions and 901 US$ millions, respectively). The pattern worsen when the whole studied period is considered, where Brazil presents itself as a net importer on all three IIT types – HIIT, VIIT-L and VIIT-H – with the respective values: 2,745 US$ millions, 4,094 US$ millions and 10,203 US$ millions [2].

Proceeding to the analysis of the gravity equations, the dependent variables (namely, Total Exports, Total Imports and Total merchandise Trade) are estimated for each IIT type (i.e. HIIT, VIIT-L and VIIT-H) through three distinct methods: Pooled OLS, Fixed Effects (Within Estimator) and Random Effects[3].

Upcoming three tests are run to determinate the proper results: a F test, a Breusch-Pagan LM test and a Hausman test. The F test is run to compare the Fixed Effects model with the Pooled OLS and, since the results for all models reject the null hypothesis, Fixed Effects appeared as a better model.

Following the F test results, it is compared the Pooled OLS with Random Effects results through a Breusch-Pagan LM test for every result. All results pointed to the acceptance of the alternative hypothesis, which points to the preference for the Random Effects results.

At last, the work compared the results of the Fixed Effects and Random Effects models through a series of Hausman tests. As expected, all results rejected the null hypothesis, showing that there is correlation between the effects and the considered variables, furthermore, the Fixed Effects have the preferred results[4] (Greene, 2012).

The following analyses are conducted based on the Fixed Effects results. First it is presented the outcomes for exports in Table III.4.2, then the work presents the results for imports in Table III.4.3 and, at last, it is displayed the results considering total trade in Table III.4.4.

As a brief preliminary analysis, variables for Brazilian GDP and Partner GDP had the expected coefficients together with most variables for NTBs, surprisingly, SPS (Sanitary and Phytosanitary) had a positive outcome. Also as expected, IFDI had a positive impact on IIT.

Although its values are dropped due to the Fixed Effects model, on Pooled OLS and Random Effects, Distance and Border variables present significant results according to the theoretical expectations, where distance between partners displays a negative impact on trade while common borders displays a positive one.

Looking to IIT types for Exports alone (Table III.4.2), it can be seen which variables impact on each type of IIT. On VIIT-L, Brazilian GDP have a positive effect, although, when

[2]The tables for the top ten values of total trade, exports and imports for HIIT, VIIT-L and VIIT-H by product and partner can be seen on Appendix B.

[3]All estimation results can be seen on Appendix B.

[4]The results for all conducted tests are presented on Appendix B.

Brazil exports low quality commodities, it has a statistically insignificant impact, whereas, GDP from the partner country appears to have a higher positive and statistically significant impact.

Inward Foreign Direct Investment also had a positive and significant impact, pointing that investment attraction is a key factor to exports, even when Brazil is the responsible for the lower quality segment.

Anti-dumping appears to have a low negative impact, although it appears as a statistically significant one. Safeguards and Technical barriers are also statistically significant at 1%, although the latter presents a low negative impact while the former presents the stronger impact among NTBs.

Countervailing is slightly less significant ($p<0.05$) than the other NTBs but have a stronger negative impact on exports when compared to measures such as anti-dumping and technical barriers. Surprisingly, Sanitary and Phytosanitary barriers had a positive and significant impact. Tariff barriers also presents the expected outcome, with negative impact and statistically significant results at 1%, suggesting that exports on VIIT-L have a negative impact from trade duties.

Focusing on vertical IIT with high quality, it can be seen that Brazilian GDP now presents a higher and statistically significant impact on exports, moreover, partner GDP presents the same patterns: higher impacts and statistically significant at 1%. That is, Brazilian GDP have a high impact on exports that achieves high quality and promote trade in vertically differentiated products.

Among NTBs, SG is the only variable that displays a 1% significant result, while CVD and TBT have lower significance and SPS presents no significance at all. Tariffs still significant on VIIT-H exports, although it has a lower impact when compared to the results on VIIT-L.

IFDI still appears with the expected positive impact on exports and, although lower when compared with exports of low quality goods, it still remains highly significantly. This results suggests that, when IFDI occurs, the shares of VIIT strengthen, probably due to the increase on goods variety.

The exports on Horizontal IIT does not appear to be impacted by Brazil's GDP, since it displays a positive value that isn't statistically significant. On the contrary, partner GDP remains statistically significant at 1% – such as in both VIIT – with a positive impact. Overall, Brazilian GDP does not affect both VIIT's and HIIT in the same way.

On NTBs the pattern for HIIT has a slightly change. ADP and SG still remains statistically significant, although with a higher impacts. CVD presents the expected coefficient sign, but it is no longer a significant result, furthermore, SPS becomes significant, such as in VIIT-L, but still displays a low impact. IFDI also displays the expected sign and maintains a similar pattern when compared to IFDI on other types of IIT, although it doesn't turn out to be statistically significant.

In contrast with the results for exports, Table III.4.3 shows that Brazilian GDP impacts its imports. It is statistically significant ($p < 0.1$) when VIIT-L is approached and displays a

Table III.4.2: Fixed Effects results (γ = 15%/α = 15%)

	Dependent variable:		
	$lnExports(X)$		
	VIIT-L	VIIT-H	HIIT
$lnGDP_{BR}$	0.121	0.455***	0.355
	(0.123)	(0.142)	(0.274)
$lnGDP_i$	1.283***	1.691***	1.467***
	(0.072)	(0.061)	(0.153)
$lnDist_i$	-	-	-
$Border_i$	-	-	-
ADP	−0.009***	−0.007***	−0.012***
	(0.001)	(0.001)	(0.002)
CVD	−0.033**	−0.041**	−0.023
	(0.014)	(0.016)	(0.030)
SG	−0.175***	−0.160***	−0.276***
	(0.024)	(0.028)	(0.054)
SPS	0.001***	0.0001	0.002***
	(0.0002)	(0.0002)	(0.0004)
TBT	−0.001***	−0.001**	−0.002**
	(0.0004)	(0.0005)	(0.001)
$Duty$	−0.028***	−0.007**	−0.012*
	(0.002)	(0.003)	(0.006)
$lnIFDI$	0.121***	0.089***	0.076
	(0.022)	(0.026)	(0.050)
$Constant$	-	-	-
Observations	62,269	54,161	14,555
R^2	0.046	0.087	0.106

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

higher coefficient, meaning that it has an impact when Brazil import commodities with higher unit value (i.e. higher quality). The impact and statistical significance becomes stronger across IIT types. When VIIT-H and HIIT are analysed, it can be seen that Brazilian GDP have a high influence on imports with low quality but achieves its peak when the trade goods have similar quality.

Partner GDP still appears as a significant variable ($p < 0.01$) with the expected positive coefficient throughout all types of IIT, with close values between VIIT-L and HIIT, but with a highlighted value for VIIT-H.

On the NTBs variables, Anti-dumping, Countervailing and Safeguards presents homogeneous results across IIT types, with the expected signs and statistical significance. Among NTBs, both SPS and TBT displays mixed results. The former presented statistical significance only on VIIT-H with a low negative coefficient, while the latter presented the same significance level – also with a low negative coefficient – only on HIIT.

Trade tariffs also had the anticipated negative impact on all IIT types, although, its influence and significance are not consistent. On VIIT-L, imports has the strongest impact and the higher significance, while on VIIT-H it has a relevant decrease on both. HIIT, at last, presents the expected sign but it is insignificant.

IFDI proves to be significant for all three types of IIT and has the expected positive impact. Although the higher impact occurs when imports has higher quality, the coefficients remain approximately homogeneous throughout the IIT.

Table III.4.4 shows the results for the Fixed Effects when Total Trade is considered the dependent variable. Consistent to the theoretical prediction, Brazil's GDP have a positive impact on total trade throughout all types of IIT, where it presents statistical significance, specially on vertically differentiated IIT with high quality in commodities and on horizontally differentiated IIT.

GDP from partner countries also appeared as positive and statistically significant – as expected from a gravity model – with the highest coefficients for vertical IIT with high quality. The explanation is that the higher the partner GDP, the higher will be the demand for Brazilian high quality goods. The described outcomes for partner GDP were expected, given that countries with larger economic sizes also have more opportunities to produce a wider variety of goods and is more likely that it engages on international trade, becoming a potential partner.

NTBs such as ADP, CVD and SG present negative and significant coefficients, a pattern similar to the previous results for exports and imports. Anti-dumping measures had similar impacts for both vertical IIT, changing only when HIIT is analysed. Impacts of Countervailing measures seems to be higher within vertically differentiated trade and horizontally differentiated trade, with the lowest coefficient for trade with low quality.

Safeguards are also significant and appear to have stronger impacts when compared to other NTBs, moreover the results imply that trade in horizontally differentiated goods suffers higher negative impacts than vertical IIT on both low and high quality. SPS and TBT also had

Table III.4.3: Fixed Effects results (γ = 15%/α = 15%)

	Dependent variable:		
	$lnImports(M)$		
	VIIT-L	VIIT-H	HIIT
$lnGDP_{BR}$	0.200*	0.339**	0.771***
	(0.119)	(0.145)	(0.280)
$lnGDP_i$	0.849***	1.786***	0.835***
	(0.070)	(0.062)	(0.156)
$lnDist_i$	-	-	-
$Border_i$	-	-	-
ADP	−0.003***	−0.003***	−0.009***
	(0.001)	(0.001)	(0.002)
CVD	−0.046***	−0.072***	−0.095***
	(0.013)	(0.016)	(0.030)
SG	−0.159***	−0.123***	−0.272***
	(0.024)	(0.029)	(0.055)
SPS	0.0001	−0.0004*	0.001
	(0.0002)	(0.0002)	(0.0004)
TBT	−0.0001	−0.0001	−0.002*
	(0.0004)	(0.0005)	(0.001)
$Duty$	−0.022***	−0.006**	−0.003
	(0.002)	(0.003)	(0.006)
$lnIFDI$	0.290***	0.218***	0.238***
	(0.022)	(0.026)	(0.051)
$Constant$	-	-	-
Observations	62,269	54,161	14,555
R^2	0.063	0.113	0.109

Source: Author's own elaboration.

Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

similar results to previous analyses, although both had insignificant effects for vertical IIT with high quality, they presented similar and significant results for vertical IIT with low quality and horizontal IIT.

Tariff barriers also follows the pattern presented on previous results, where it has a negative and significant result in vertical IIT for both low and high quality – although the effect is more intense on the former – and it is negative but not significant for horizontal IIT.

Inward FDI also repeats its importance to intra-industry trade. Although it has the expected signal and significance throughout all IIT, on VIIT-H it displays the lowest when compared to other trade types, followed by Horizontal IIT and achieving the highest effect on Vertical IIT with low quality, suggesting that IFDI has impacts on quality upgrading process.

The results imply that IFDI impacts are stronger on vertically differentiated good with low quality due to the geographical disaggregation of production process from MNEs, where Brazil becomes a step in a larger operation. Further research should be done on this hypothesis, disaggregating FDI between Horizontal (i.e. Market-seeking) and Vertical (i.e. Resource-seeking) to test each impact on Brazilian Intra-Industry Trade.

Comparing the results throughout the dependent variables (i.e Exports, Imports and Total Trade), Brazilian GDP displayed a small significance for VIIT-L, with the highest impact on imports. On the other hand, the results for partner's GDP are positive and significant and, on VIIT-L, it achieves the highest effect for exports, showing that partner's economic size have a greater influence on exports than on imports.

All NTBs variables (ADP, CVD, SG, SPS and TBT) displays statistically significant results for VIIT-L on exports and total trade, with the same similar patterns. For imports, Anti-dumping, Countervailing and Safeguards remain significant, although Sanitary and Phytosanitary and Technical barriers do not display the statistical significance displayed on previously, moreover the coefficients remains equally low.

The coefficient of trade tariffs remains negative and significant for VIIT-L throughout all dependent variables (X, M and TT). Curiously, imports displays the lowest impact from the tariffs applied by Brazil, whereas, exports displays the highest effects. These results suggests that low quality goods exported by Brazil suffers more than the high quality imports, pointing that, exports likely suffers retaliations when a tariff is implemented.

Analysing IFDI for VIIT-L, the results presented are positive and significant when exports and imports are considered as a dependent variable. The positive effects are the lowest for exports, while imports has the highest one, suggesting that foreign direct investments have greater impact on high quality imports. For Intra-Industry Trade as a whole (i.e. when Total Trade is the dependent variable), IFDI also displays a positive and significant coefficient, showing that VIIT-L response to IFDI is similar.

Changing the focus for Vertical Intra-Industry Trade for high quality, it can be seen that Brazilian GDP is significant and positive for both exports and imports and for total trade. As expected, these results are consistent with theory. When compared, Brazil's GDP suggests higher

Table III.4.4: Fixed Effects results (γ = 15%/α = 15%)

	Dependent variable:		
	$lnTotalTrade(TT)$		
	VIIT-L	VIIT-H	HIIT
$lnGDP_{BR}$	0.180*	0.389***	0.508**
	(0.109)	(0.129)	(0.244)
$lnGDP_i$	1.056***	1.768***	1.151***
	(0.063)	(0.055)	(0.136)
$lnDist_i$	-	-	-
$Border_i$	-	-	-
ADP	−0.005***	−0.005***	−0.010***
	(0.001)	(0.001)	(0.002)
CVD	−0.038***	−0.060***	−0.056**
	(0.012)	(0.015)	(0.026)
SG	−0.164***	−0.143***	−0.274***
	(0.021)	(0.026)	(0.048)
SPS	0.0005***	−0.0001	0.001***
	(0.0002)	(0.0002)	(0.0004)
TBT	−0.001**	−0.0005	−0.002**
	(0.0004)	(0.0004)	(0.001)
$Duty$	−0.025***	−0.007***	−0.007
	(0.002)	(0.003)	(0.005)
$lnIFDI$	0.204***	0.154***	0.165***
	(0.020)	(0.024)	(0.044)
$Constant$	-	-	-
Observations	62,269	54,161	14,555
R^2	0.064	0.121	0.130

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

influence and significance on exports with relative high quality than on imports with relative low quality. Total Trade also presents a positive and significant result, as expected.

Looking to partners' GDP alone, it displays the same patterns across the dependent variables, where all coefficients are positive and statistically significant at 1%, although with higher impact for imports with relative low quality (i.e. imports within VIIT-H) than for exports with high quality.

On Vertical IIT for high quality, Anti-dumping measures has similar impacts for exports, imports and total trade. For each dependent variable the results are negative and highly significant, with the stronger impact on exports and the weaker on imports. Such as in VIIT-L, exports of high quality goods appears to suffer more than imports from ADP measures.

CVD and SG had similar results, where it displays negative and statistically significant effects throughout the dependent variables but, on the contrary, SPS and TBT do not displays great relevance, with low effects and mostly insignificant, since the former is significant only for imports while the latter presents significance only for exports.

Trade tariffs (i.e. $Duty$) display a negative and significant result for all dependent variables on VIIT-H. Although the outcome for total trade presents a higher statistical significance ($p<0.01$) than the outcomes for exports and imports ($p<0.05$), it is similar to the impact on exports, which suffers the strongest impact when compared to imports, suggesting again that implementing trade tariffs could trigger retaliatory measures from Brazil's partners.

IFDI on VIIT-H present the expected results for all dependent variables, displaying positive and significant results. When comparing export and import results, it can be seen that imports situated on this type of IIT have a higher impact of this type of investment than exports, suggesting – as in the results for VIIT-L – that IFDI can strengthen imports more than exports.

At last, looking strictly for Horizontal Intra-Industry Trade results, we can see that, surprisingly, Brazilian GDP, even though it is positive, isn't significant for exports. For imports and for total trade the coefficients turn out to be higher and significant, as according to the theoretical expectations. Changing to Partners' GDP, it appears to have a higher influence on exports in horizontally differentiated goods than in imports and total trade. For this latter variable, all estimations displays positive and statistically significant results.

Again, analysing the results for NTBs, it can be seen that ADP remains negative and significant across all dependent variables and brings the highest effect on exports, such as in the results for the previous trade types. Countervailing shows a different pattern. It still displays the expected negative coefficient, although it does not appear as statistically significant for exports, such as in the vertical IIT.

Safeguards exhibit fairly homogeneous results across dependent variables. Throughout exports, imports and total trade for HIIT, the results displayed present negative impacts (as expected from a trade barrier) and statistical significance, with the strongest impact on exports and the weakest on imports. At last, SPS and TBT do not display diverging results on HIIT when compared to both VIIT, since they still present mixed results with small-scale effects.

Trade tariffs has unalike results, although it displays the negative effect from an implemented trade duty, its impact appears to be insignificant when imports or total trade are considered, only the results for exports on HIIT appears to be significant. These estimations display odd results, since it was expected that trade duties was significant across all HIIT, such as in trade for vertically differentiated goods with both low and high quality.

Finally, analysing IFDI, we can see that it shows the expected sign and, in accordance with the results for VIITs, it affects positively the dependent variables, specially for imports, which has the highest impact. Although on HIIT exports results are not significant, only results for imports and total trade appears to be statistically significant.

As expected from Figure III.4.2 – considering $\gamma = 15\%$ and $\alpha = 15\%$ – Intra-Industry Trade of vertically differentiated goods with low quality had the higher number of observations (62.269), followed by trade with high quality (54,161) and horizontally differentiated goods (14,555) on the estimations for all dependent variables (X, M and TT).

Comparing the trade types throughout all dependent variables, HIIT shows the best fit (R^2 = 0.106 for exports, 0.109 for imports and 0.13 for total trade), followed by VIIT-H (R^2 = 0.087 for exports, 0.113 for imports and 0.121 for total trade) and VIIT-L (R^2 = 0.046 for exports, 0.063 for imports and 0.064 for total trade) and, although the R^2 results are relatively low, it is similar to previous studies. Although total trade displays the best fits for all trade types, estimations for exports and imports suggests interesting results and further research could work with additional country- and industry-specific determinants (e.g. difference in GDP per capita, difference in capital-to-labor ratio, Tariffs and NTBs applied by partner countries, free trade agreements or R&D), revealing more dynamics within IIT.

III.5 CONCLUSIONS

The present work aims to add to the growing literature on IIT, since it has contradicted the predictions made by traditional trade theories based on specialization and comparative advantages. The research conducted sets out to examine the Brazilian intra-industry trade considering three response variables – Exports, Imports and Total trade – focusing on country- and industry-specific determinants, considering trade barriers (both tariff and non-tariff ones) and investments (Inward Foreign Direct Investment), using extremely detailed data.

First, the data was disaggregated into Inter-Industry Trade (IET) and Intra-Industry Trade (IIT) using a methodology applied by previous works, then IIT was disentangled not only between HIIT and VIIT, but also between HIIT, VIIT-L and VIIT-H, separating the Vertical IIT by the commodity relative quality.

Second, it was investigated the behavior of each trade type – IET/IIT and HIIT/VIIT-L/VIIT-H – throughout the entire 17-year time span. Following,the GL index was used to see if there were differences among country types and analyzed the top partner countries and commodities for each trade type.

At last, the determinants for each IIT type were estimated for all dispersion (γ and α) combination. Due the limitation of space, only one dispersion combination was analyzed. The analysis points out to a significant, although expected, result, showing that Brazilian trade suffered dominance from IET, which corroborates the theory and previous empirical works. Looking solely to IIT, the data showed that HIIT responds only to a small percentage of it (around 10%) while the major part is dominated by VIIT, both low and high quality.

Some results were as expected. Brazilian GDP proved to be a main determinant for IIT with a positive impact for all its types, even when exports or imports are considered as a dependent variable. Partners' GDP also had similar positive results for all estimations, as anticipated.

Common borders and Distance results were similar to predicted by the theories. Results for common borders were positive and significant for all estimations, as expected, since it captures similarity between demands, natural resources, cultural traits or industries between countries. Distance, as a proxy for transport costs, also displays the negative and significant results for all estimations. Both variables did not had their results discussed on this work due to the test results (i.e. F, Breusch-Pagan LM and Hausman tests) that suggested the Fixed Effects as the best models.

Another finding regarding the determinants is that, even though barriers to trade presented some mixing results, they were mostly negative and significant throughout all trade types, models and dependent variables, pointing to its harmful nature, as pointed by previous authors such as Fukao et al. (2003), Zhang (2005) and Kinzius et al. (2019). The outcomes suggest that tariff and non-tariff barriers are detrimental to trade and a significant part of this damage could be derived from retaliatory measures taken by partner countries, furthermore, it also indicates that an effort from the policy makers on lowering these barriers, or even promoting PTAs, could bring fruitful results for Brazilian IIT.

The last main finding is based on the importance of attracting Foreign Direct Investments (FDI) to a country's trade. Its major role is endorsed by the estimation results, which displays positive and highly significant impacts, suggesting that this specific investment type – which can promote technology development – have crucial effects on trade flows for all types of Intra-Industry Trade, exhibiting its participation on product development and commodities' quality upgrading (Hu and Ma, 1999).

At last, this study also indicates that decomposing trade into IET and IIT and, furthermore, into Horizontal IIT, Vertical IIT with low quality and Vertical IIT with high quality is a viable way to uncover trade dynamics and its relationships with its determinants.

Part IV

Conclusion

The present dissertation consists of two different essays. The first essay examines the Brazilian attraction of foreign direct investment, looking to determinants previously pointed as significant by the literature, such as market size (expressed by real GDP), trade openness or exchange rate (Arbatli, 2011; Kogut and Chang, 1996; Froot and Stein, 1991). The results add to the literature on IFDI, since through time series analysis, the results suggest that increasing institutional quality – along with other country-specific pull factors such as trade openness – could turn Brazil more attractive to foreign firms.

The second essay provides an extensive empirical study on intra-industry trade and the impact it suffers from trade barriers and IFDI. A wide dataset is constructed with various detailed sources, providing extensive data for variables such as commodity, partner, exports value, imports value, anti-dumping measures or unit value, among others.

The data show that Brazil is mainly dominated by Inter-Industry Trade – a pattern expected for a developing country – and it does not show abrupt changes throughout the period. Disaggregating through country groups (i.e. developing, developed and transition) also displays the same results, where trade is concentrated on low GL index values. Focusing on IIT, vertically differentiated goods display a predominant behavior, suggesting that most of Intra-Industry Trade takes place when Brazilian goods have higher or lower quality, while the smaller share takes place when the traded good have technical differences.

The model was estimated with three different methods (i.e. Pooled OLS, Fixed Effects and Random Effects) for all the dispersion cut-offs suggested by previous literature and the results undergo on a series of tests to determinate which ones were the appropriate. The results provided are statistically significant and points to the expected direction, where trade barriers (both tariff and non-tariff) mostly have a negative impact on all IIT types (i.e. HIIT and VIIT for both high and low quality), while IFDI displays positive impacts. The result also displays that protectionist measures can be harmful not only to exports from Brazil's partners, since most trade barriers have negative impacts and, in certain cases, these impacts turn out to be worse for Brazilian exports than imports. On the other hand, IFDI presented positive impacts on all displayed results, interestingly with stronger impacts on imports when compared to exports, especially within VIIT.

The results presented on both essays suggest that foreign direct investment inflows has meaningful impacts on Brazilian economy, since it can improve IIT as a whole, which could imply quality upgrading, increased national commodities variety, improved economies of scale and diminishing technological differences, such as seen on other countries (Ambroziak, 2016; Sawyer et al., 2010; Xing, 2007).

In light of the present outcomes, the work refers to the preeminent role of foreign investment on the development of Brazilian intra-industry trade, suggesting that it is a crucial piece for trade as a whole and for the development of the economy. Together, both essays display meaningful results, showing that foreign investments inflows cloud be higher once Brazil displays better institutional development and political stability. This result goes in line with previous works which advocate that improvements in topics such as corruption, rule of law or good governance would make an economy more appealing to foreign investments.

Results also show that IIT must be broken down between horizontally and vertically differentiated goods, specially by VIIT-L and VIIT-H, since they respond differently to each determinant. Total trade also displays different impacts when disaggregating and investigating exports and imports separately, showing that it could reveal interesting results. Finally, our work contributes to the literature for Brazil's trade and investment while also provide empirical and insightful evidence on the approached topics.

REFERENCES

Abd-el Rahman, K. (1991). Firms' competitive and national comparative advantages as joint determinants of trade composition. *Weltwirtschaftliches Archiv*, 127:83–97.

Acemoglu, D., Johnson, S., and Robinson, J. (2004). The colonial origins of comparative development. *American Economic Review*, 91(5):1369–1401.

Adams, R., Dee, P., Gali, J., and McGuire, G. (2003). The trade and investment effects of preferential trading arrangements - old and new evidence. *Productivity Commission - Staff Working Paper*.

Akaike, H. (1969). Fitting autoregressive models for prediction. *Annals of the Institute of Statistical Mathematics*, 21:243–247.

Akaike, H. (1971). Autoregressive model fitting for control. *Annals of the Institute of Statistical Mathematics*, 23:163–180.

Akaike, H. (1974). A new look at the statistical model identification. *IEEE Transactions on Automatic Control*, 19(6):716–723.

Alvarado, R., Iñigez, M., and Ponce, P. (2017). Foreign direct investment and economic growth in larin america. *Economic Analysis and Policy*, 56:176–187.

Ambroziak, L. (2016). Fdi and intra-industry trade in the automotive industry in the new eu member states. *International Journal of Management and Economic*, 52(1):23–42.

Anderson, J. E. and van Wincoop, E. (2004). Trade costs. *Journal of Economic Literature*, 42:691–751.

Andresen, M. A. (2003). Empirical intra-industry trade: what we know and what we need to know. *University of British Columbia*.

Arbatli, E. (2011). Economic policies and fdi inflows to emerging market economies. *IMF Working Paper*, 11(192).

Baier, S. L. and Bergstrand, J. H. (2001). The growth of world trade: tariffs, transport costs, and income similarity. *Journal of International Economics*, 53:1–27.

Balassa, B. (1966). Tariff reductions and trade in manufactures among the industrial countries. *American Economic Review*, 56:466–473.

Balassa, B. and Bauwens, L. (1987). Intra-industry specialisation in a multi-country and multi-industry framework. *The Economic Journal*, 97:923–939.

Baltagi, B. H. (2005). *Econometric Analysis of Panel Data - Third Edition*. John Wiley & Sons.

Baltar, C. T. (2008). Comércio exterior inter e intra-industrial: Brasil 2003-2005. *Economia e Sociedade*, 17(1):107–134.

Barattieri, A., Cacciatore, M., and Ghironi, F. (2021). Protectionism and the business cycle. *Journal of International Economics*, 129.

Besedeš, T. and Prusa, T. J. (2017). The hazardous effects of antidumping. *Economic Inquiry*, 55(1):9–30.

Bevan, A. A. and Estrin, S. (2004). The determinants of foreign direct investment into european transition economies. *Journal of Comparative Economics*, 32:775–787.

Blanes, J. V. and Martín, C. (2000). The nature and causes of intra-industry trade: Back to the comparative advantage explanation? the case of spain. *Weltwirtschaftliches Archiv*, 136(3):423–441.

Blonigen, B. A. (2005). A revies of the empirical literature on fdi determinants. *Atlantic Economic Journal*, 33:383–403.

Botrić, V. (2013). Determinants of intra-industry trade between western balkans and eu-15: Evidence from bilateral data. *International Journal of Economic Sciences and Applied Research*, 6(2):7–23.

Brülhart, M. (1994). Marginal intra-industry trade: measurement and relevance for the pattern of industrial adjustment. *Weltwirtschaftliches Archiv*, 130:600–613.

Buckley, P. J. and Casson, M. (1981). The optimal timing of foreign direct investment. *Economic Journal*, 91(361):75–87.

Bénassy-Quéré, A., Coupet, M., and Mayer, T. (2007). Institutional determinants of foreign direct investment. *World Economy*, 30(5):764–782.

Bénassy-Quéré, A., Fontagné, L., and Lagrèche-Révil, A. (2005). How does fdi react to corporate taxation? *International Tax and Public Finance*, 12:583–603.

Campa, J. M. (1993). Entry by foreign firms in the u.s. under exchange rate uncertainty. *Review of Economics and Statistics*, 75(4):614–622.

Campos, N. F. and Kinoshita, Y. (2003). Why does fdi go where it goes? new evidence from the transition economies. *International Monetary Fund Institute: Working Paper*, 3(228).

Cantah, G. D., Brafu-Insaidoo, G. W., Wiafe, E. A., and Adams, A. (2016). Fdi and trade policy openness in sub-saharan africa. *Eastern Economic Journal*, pages 1–20.

Carmo, A. S. S. and Bittencourt, M. V. L. (2013). O comércio intraindustrial entre brasil e os países da ocde: Decomposição e análise de seus determinantes. *Análise Econômica*, 31(60):35–58.

Castro, A. (1976). As empresas estrangeiras no brasil (1860-1913). Master's thesis, Departamento de Economia e Planejamento Econômico - Instituto de Filosofia e Ciências Humanas - UNICAMP, Campinas - SP.

Caves, R. E. (1981). Intra-industry trade and market structure in the industrial countries. *Oxford Economic Papers*, 33(2):203–223.

Chakrabarti, A. (2001). The determinants of foreign direct investment: Sensitivity analyses of cross-country regressions. *Kyklos*, 54(1):89–114.

Clark, D. P. (1993). Recent evidence on determinants of intra-industry trade. *Weltwirtschaftliches Archiv*, 129:332–344.

Crespo, N. and Fontoura, M. (2004). Intra-industry trade by types: what can we learn from portuguese data? *Review of World Economics*, 140(1):52–79.

Curado, M. and Cruz, M. J. V. (2008). Investimento direto externo e industrialização no brasil. *Revista de Economia Contemporânea*, 12(3):399–431.

Daniele, V. and Marani, U. (2006). Do institutions matter for fdi? a comparative analysis for mena countries. In *Bridging the Gap: the Rola of Trade and FDI in the Mediterranean*, Naples.

de Castro, P. G. (2012). The fdi determinants in brazil and mexico: an empirical analysis for the period 1990 to 2010. Master's thesis, Programa de Pós-Graduação em Desenvolvimento econômico e Políticas públicas - Universidade Federal de Viçosa, Viçosa - MG.

de Mattos, L. B., Cassuce, F. C. C., and Campos, A. C. (2007). Determinantes dos investimentos diretos estrangeiros no brasil, 1980-2004. *Revista de Economia Contemporânea*, 11(1):39–60.

de Mooij, R. A. and Ederveen, S. (2003). Taxation and foreign direct investment: A synthesis of empirical research. *International Tax and Public Finance*, 10(6):673–693.

Desai, M. A., Foley, F. C., and Forbes, K. J. (2004a). Financial constraints and growth: Multinational and local firm responses to currency crises. *NBER Working Paper No. 10545*.

Desai, M. A. and Jr., J. R. H. (1999). 'basket cases': Tax incentives and international joint venture participation by american multinational firms. *Journal of Public Economics*, 71(3):379–402.

Desai, M. D., Foley, F. C., and Jr., J. R. H. (2004b). Foreign direct investment in a world of multiple taxes. *Journal of Public Economics*, 88(12):2727–2744.

do Brasil, B. C. (2021). Balanço de pagamentos (bpm5) (bcb / bp (bpm5)). `http://www.ipeadata.gov.br/Default.aspx`. Acessado em 10/06/2021.

Dunning, J. H. (1977). *Trade, Locarion of Economic Activity and MNE: A Search for an Eclectic Approach*, pages 395–418. Macmillan.

Dunning, J. H. (1981). *International Production and the Multinational Enterprise*. George Allen and Unwin, London.

Durkin, J. T. and Krygier, M. (2000). Differences in gdp per capita and the share of intraindustry trade: the role of vertically differentiated trade. *Review of International Economics*, 8(4):760–774.

Economou, F., Hassapis, C., Philippas, N., and Tsionas, M. (2016). Foreign direct investment determinants in oecd and developing countries. *Review of Development Economics*, 21(3):527–542.

Egger, H., Egger, P., and Greenaway, D. (2004). Intra-industry trade with multinational firms: Theory, measurement and determinants. *Research Paper*, 10.

Ekanayake, E. M., Halkides, M., Rance, R., and Filyanova, I. (2007). Intra-industry trade between the united states and latin american countries. *The International Journal of Business and Finance Research*, 1(2):1–37.

Ekanayake, E. M. and Ledgerwood, J. (2008). The u.s. intra-industry trade with caribbean countries. *Southwestern Economic Review*, 35(1).

Enders, W. (2014). *Applied Econometric Time Series, 4ht Edition*. Wiley.

Engle, R. F. and Granger, C. W. J. (1987). Co-integration and error correction: Representation, estimation, and testing. *Econometrica*, 55(2):251–276.

Falvey, R. E. (1981). Commercial policy and intra-industry trade. *Journal of International Economics*, 11:495–511.

Falvey, R. E. and Kierzkowski, H. (1987). *Product Quality, Intra-Industry Trade and (Im)perfect Competition*, pages 143–161. Oxford: Basil Blackwell.

Flam, H. and Helpman, E. (1987). Vertical product differentiation and north-south trade. *The American Economic Review*, 77(5):810–822.

Fontagné, L. and Freudenberg, M. (1997). Intra-industry trade: Methodological issues reconsidered. *CEPII working paper*, 97-01.

Fontagné, L., Freudenberg, M., and Guillaume, G. (2005). Disentangling horizontal and vertical intra-industry trade. *CEPII Working Paper*, 2005(10):1–37.

Fontagné, L., Freudenberg, M., and Nicholas, P. (1997). Trade patterns inside the single market. *CEPII working paper*, 1997-07.

Fontagné, L., Freudenberg, M., and Péridy, N. (1998). Intra-industry trade and the single market: Quality matters. *CEPR Discussion Paper*, 1959.

Froot, K. A. and Stein, J. C. (1991). Exchange rates and foreign direct investment: An imperfect capital markets approach. *Quarterly Journal of Economics*, 106(4):1191–1217.

Fukao, K., Ishido, H., and Ito, K. (2003). Vertical intra-industry trade and foreign direct investment in east asia. *Journal of the Japanese and International Economies*, 2003(17):468–506.

Fung, K. C., Garcia-Herrero, A., Iizaka, H., and Siu, A. (2005). Hard of soft? institutional reforms and infrastructure spending as determinants of foreign direct investment in china. *Japanese Economic Review*, 56(4):408–416.

Gao, T. (2005). Labor quality and the location of foreign direct investment: Evidence from china. *China Economic Review*, 16:274–292.

Giambiagi, F. (2016). *Economia brasileira contemporânea (1945-2015)*, pages 197–237. Elsevier, Rio de Janeiro.

Goldberg, L. S. and Kolstad, C. D. (1995). Foreign direct investment, exchange rate variability and demand uncertainty. *International Economic Review*, 36(4):855–873.

Gordon, R. H. and Jr., J. R. H. (2002). International taxation. *NBER Working Paper*, 8854.

Granger, C. W. J. and Lee, T.-H. (1990). *Advances in Econometrics: Cointegration, Spurious Regressions and unit Roots*, pages 71–84. JAI Press.

Greenaway, D., Hine, R., and Milner, C. (1994). Country-specific factors and the pattern of horizontal and vertical intra-industry trade in the u.k. *Weltwirtschaftliches Archiv*, 130(1):77–100.

Greenaway, D., Hine, R., and Milner, C. (1995). Vertical and horizontal intra-industry trade: a cross industry analysis for the united kingdom. *Economic Journal*, 105:1505–1518.

Greene, W. H. (2012). *Econometric Analysis - Seventh Edition*. Pearson.

Gregory, D. and Oliveira, M. F. B. A. (2005). O desenvolvimento de ambiente favorável no brasil para a atração de investimento estrangeiro direto. *INVESTE BRASIL*.

Grubel, H. G. and Lloyd, P. (1975). *Intra-Industry Trade, the Theory and Measurement of International Trade in Differentiated Products*. MacMillan.

Grubert, H. and Mutti, J. (1991). Taxes, tariffs and transfer pricing in multinational corporate decision making. *Review of Economics and Statistics*, 73(2):285–293.

Hamilton, C. and Kniest, P. (1991). Trade liberalisation, structural adjustment and intra-industry trade: a note. *Weltwirtschaftliches Archiv*, 127:356–367.

Hannan, E. J. and Quinn, B. G. (1979). The determination of the order of an autoregression. *Journal of the Royal Statistical Society*, B41(2):190–195.

Hartman, D. G. (1984). Tax policy and foreign direct investment in the united states. *National Tax Journal*, 37(4):475–487.

Hartman, D. G. (1985). Tax policy and foreign direct investment. *Journal of Public Economics*, 26(1):107–121.

Head, K. and Ries, J. (2001). Overseas investment and firm exports. *Review of International Economics*, 9(1):108–122.

Helpman, E. (1981). International trade in the presence of product differentiation, economies of scale and monopolistic competition: a chamberlain-heckscher-ohlin approach. *Journal of International Economics*, 11:305–340.

Helpman, E. (2006). Trade, fdi, and the organization of firms. *Journal of Economic Literature*, 44:589–630.

Hidalgo, A. B. (1993). O intercâmbio comercial brasileiro intra-indústria: uma análise entre indústrias e entre países. *Revista Brasileira de Economia*, 47(2):243–264.

Hines, J. R. (1999). Lessons from behavioral responses to international taxation. *National Tax Journal*, 52(2):305–322.

Hoffmann, R. (2016). *Análise de Regressão: Uma Introdução à Econometria*. Hucitec Editora.

Hu, X. and Ma, Y. (1999). International intra-industry trade in china. *Weltwirtschaftliches Archiv*, 135:82–101.

Hubbard, C., Alvim, A. M., Mattos, E. J., and Hubbard, L. (2014). Eu agri-food trade with the bricss: The case of brazil. In *88th Agricultural Economics Society Conference*, Paris - France.

IMF (2017). *World Economic Outlook: Gaining Momentum?* International Monetary Fund, Research Dept.

Ismail, R. and Yussof, I. (2003). Labour market competitiveness and foreign direct investment: The case of malaysia, thailand and the philippines. *Papers in Regional Science*, 82:389–402.

Iwai, N. and Thompson, S. R. (2012). Foreign direct investment and labor quality in developing countries. *Review of Development Economics*, 16(2):276–290.

Jordà, O. (2005). Estimation and inference of impulse responses by local projections. *The American Economic Review*, 95(1):161–182.

Jr., J. R. H. (1995). Altered states: Taxes and the location of foreign direct investment in america. *American Economic Review*, 86(5):1076–1094.

Kinzius, L., Sandkamo, A., and Yalcin, E. (2019). Trade protection and the role of non-tariff barriers. *Review of World Economics*, 115:603–643.

Klein, M. W. and Rosengren, E. S. (1994). The real exchange rate and foreign direct investment in the united states: Relative wealth vs. relative wage effects. *Journal of International Economics*, 36:373–389.

Kogut, B. and Chang, S. J. (1996). Platform investments and volatile exchange rates: Direct investment in the u.s. by japanese electronic companies. *Review of Economics and Statistics*, 78(2):221–231.

Kok, R. and Ersoy, B. A. (2009). Analyses of fdi determinants in developing countries. *International Journal of Social Economics*, 36(1/2):105–123.

Kostevc, Č., Redek, T., and Sušjan, A. (2007). Foreign direct investment and institutional environment in transition economies. *Transition Studies Review*, 14(1):40–54.

Krifa-Schneider, H. and Matei, I. (2010). Business climate, political risk and fdi in developing countries: Evidence from panel data. *International Journal of Economics and Finance*, 2(5):54–65.

Krugman, P. R. (1979). Increasing returns, monopolistic competition, and international trade. *Journal of International Economics*, 9:469–479.

Kwiatkowski, D., Phillips, P. C. B., Schmidt, P., and Shin, Y. (1992). Testing the null hypothesis of stationarity against the alternative of a unit root: How sure are we that economic time series have a unit root? *Journal of Econometrics*, 54(1-3):159–178.

Lancaster, K. (1980). Intra-industry trade under perfect monopolistic competition. *Journal of International Economics*, 10:151–175.

Lane, P. R. and Milesi-Ferretti, G. M. (2000). External capital structure: Theory and evidence. *Centre for Economic and Policy Research, Discussion Paper*, 2583.

Liew, V. K. S. (2004). Which lag length selection criteria should we employ? *Economics Bulletin*, 3(33):1–9.

Lim, E. G. (2001). Determinants of, and the relation between, foreign direct investment and growth: A summary of the recent literature. *IMF Working Paper*, 1/175.

Lipsey, R. (1976). Review of grubel and lloyd (1975). *Journal of International Economics*, 6:312–314.

Lipsey, R. E. (2001). Foreign direct investors in three financial crises. *NBER Working Paper*, 8084.

Majeed, M. T. and Ahmad, E. (2009). An analysis of host country characteristics that determine fdi in developing countries: Recent panel data evidence. *The Labore Journal of Economics*, 14(2):71–96.

Markusen, J. R. (1995). The boundaries of multinational enterprises and the theory of international trade. *Journal of Economic Perspectives*, 9(2):169–189.

Markusen, J. R. and Venables, A. J. (1999). Foreign direct investment as a catalyst for industrial development. *European Economic Review*, 43:335–356.

Masron, T. A. and Abdullah, H. (2010). Institutional quality as a determinant for fdi inflows: Evidence from asean. *World Journal of Management*, 2(3):115–128.

Mayer, T. and Zignago, S. (2005). Market acess in global and regional trade. *CEPII Working Paper*, 2.

Mazzucco, B. L. C. and Bittencourt, M. V. L. (2019). Efeitos macroeconômicos da defesa comercial no brasil. *Revista de Economia e Agronegócio*, 17(2):189–209.

Medvedev, D. (2012). Beyond trade: The impact of preferential trade agreements on fdi inflows. *World Development*, 40(1):49–61.

Merz, J., Overesch, M., and Wamser, G. (2017). The location of financial sector fdi: Tax and regulation policy. *Journal of Banking and Finance*, 78:14–26.

Miranda, S. H. G. (2001). *Quantificação dos efeitos das barreiras não-tarifárias sobre as exportações brasileiras de carne bovina*. PhD thesis, Universidade de São Paulo, Piracicaba.

Moro, O. F. D., Michellon, E., Hybner, B. R., and da Silva, L. N. S. (2020). O investimento estrangeiro direto (ied) e seus determinantes: uma análise para a economia brasileira no período 1995-2016 a partir de um modelo vec. *A Economia em Revista*, 28(2):55–71.

Noorbakhsh, F., Paloni, A., and Youssef, A. (2001). Human capital and fdi inflows to developing countries: New empirical evidence. *World Development*, 29:1593–1610.

Peres, S. C. and Yamada, T. H. (2014). Determinantes do investimento estrangeiro direto no brasil: uma aplicação do modelo de vetores autorregressivos (var) no período 1980-2010. *Revista de Economia e Desenvolvimento*, 26(2):01–20.

Perron, P. (1988). Trends and random walks in macroeconomic time series: Further evidence from a new approach. *Journal of Economic Dynamics and Control*, 12(2-3):297–332.

Petrović, V. and Mirović, I. (2018). The link of intra-industry trade with foreign direct investments. *Economic Themes*, 56(3):357–368.

Possas, M. L. (1998). *Empresas multinacionais e industrialização no Brasil*, pages 9–43. Instituto de Economia da Universidade Estadual de Campinas.

Ribeiro, E. J. J. and Filho, E. B. S. (2013). Investimento externo direto no brasil no período 2003-2012: aspectos regionais e setoriais. *Boletim de Economia e Política Internacional (BEPI)*, 14:29–46.

Said, S. E. and Dickey, D. A. (1984). Testing for unit roots in autoregressive-moving average models of unknown order. *Biometrika*, 71(3):599–607.

Santos, H. C., Silva, C., and Souza, T. A. (2016). Análise empírica da determinação do investimento estrangeiro direto no brasil para o período posterior a 1990. In *XIX ENCONTRO DE ECONOMIA DA REGIÃO SUL*, Florianópolis - Brasil.

Sawyer, W. C., Sprinkle, R. L., and Tochkov, K. (2010). Patterns and determinants of intra-industry trade in asia. *Journal of Asian Economics*, 21:485–493.

Scholes, M. S. and Wolfson, M. A. (1990). The effects of changes in tax law on corporate reorganization activity. *Journal of Business*, 63:141–164.

Schwarz, G. (1978). Estimating the dimension of a model. *The Annals of Statistics*, 6(2):461–464.

Sekkat, K. and Veganzones-Varoudakis, M. (2007). Openness, investment climate, and fdi in developing countries. *Review of Development Economics*, 11(4):607–620.

Shatz, H. and Venables, A. J. (2000). The geography of international investment. *World Bank Policy Research Working Paper*, 2338.

Stern, N. (2003). Investment climate: Lessons and challenges. *The Egyptian Centre for Economic Studies, Distinguished Lecture Series 19*.

Stiglitz, J. E. (1987). The causes and consequences of the dependence of quality on price. *Journal of Economic Literature*, 25:1–48.

Swenson, D. L. (1994). The impact of u.s. tax reform on foreign direct investment: A note. *Journal of Public Economics*, 54(2):243–266.

Swenson, D. L. (2004). Foreign investment and mediation of trade flows. *Review of International Economics*, 12(4):609–629.

Trefler, D. (2004). The long and short of the canada-u.s. free trade agreement. *The American Economic Review*, 94(4):870–895.

Uddin, M., Chowdhury, A., Zafar, S., Shafique, S., and Liu, J. (2019). Institutional determinants of inward fdi: Evidence from pakistan. *International Business Review*, 28:344–358.

UNCTAD (2020). United nations conference on trade and development - unctad stat. `https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx`. Acess on 02/08/2021.

Vasconcelos, C. R. F. (2003). O comércio brasil-mercosul na década de 90: Uma análise pela Ótica do comércio intra-indústria. *Revista Brasileira de Economia*, 57(1):283–313.

Villela, A. V. and Suzigan, W. (1975). Política do governo e crescimento da economia brasileira: 1889-1945. *IPEA/INPES*, 10.

Wei, S. J. (2000a). How taxing is corruption on international investors? *Review of Economics and Statistics*, 82(1):1–11.

Wei, S. J. (2000b). Local corruption and global capital flows. *Brookings Papers on Economic Activity*, 2000(2):303–346.

Wheeler, D. and Mody, A. (1992). International investment location decisions: The case of u.s. firms. *Journal of International Economics*, 33(1):57–76.

Xing, Y. (2007). Foreign direct investment and china's bilateral intra-industry trade with japan and the us. *Journal of Asian Economics*, 18:685–700.

Yao, S. (2006). On economic growth, fdi and exports in china. *Applied Economics*, 38(3):339–351.

Zhang, Y. (2005). *Essays on Intra-Industry Trade*. PhD thesis, University of Tennessee, Knoxville - USA. 119 pgs.

Černoša, S. (2007). Horizontal and vertical intra-industry trade between the former cefta countries and the european union. *Managing Global Transitions*, 5(2):157–178.

APPENDIX A – ESSAY I

Table A.1: Optimal lag lenght - Drift

Lags	AIC	HQC	SC	FPE
1	-32.973	-32.421*	-31.596*	$4.79e-15$
2	-33.089	-32.353	-31.253	$4.27e-15$
3	-33.174	-32.254	-30.878	$3.93e-15$
4	-33.338*	-32.234	-30.584	$3.34e-15$*
5	-33.303	-32.016	-30.090	$3.48e-15$
6	-33.215	-31.743	-29.542	$3.83e-15$
7	-33.140	-31.485	-29.009	$4.16e-15$
8	-33.070	-31.231	-28.480	$4.50e-15$
9	-33.028	-31.005	-27.979	$4.76e-15$
10	-33.044	-30.836	-27.535	$4.76e-15$
11	-32.901	-30.510	-26.934	$5.59e-15$
12	-32.912	-30.337	-26.486	$5.65e-15$

* *represents the optimum lag.*

Table A.2: Optimal lag lenght - Drift and trend

Lags	AIC	HQC	SC	FPE
1	-32.933	-32.350*	-31.479*	$4.98e-15$
2	-33.050	-32.283	-31.137	$4.44e-15$
3	-33.136	-32.185	-30.764	$4.08e-15$
4	-33.302*	-32.167	-30.471	$3.47e-15$*
5	-33.269	-31.951	-29.979	$3.60e-15$
6	-33.180	-31.678	-29.431	$3.97e-15$
7	-33.107	-31.421	-28.899	$4.30e-15$
8	-33.037	-31.167	-28.371	$4.66e-15$
9	-32.997	-30.943	-27.872	$4.92e-15$
10	-33.014	-30.776	-27.429	$4.91e-15$
11	-32.873	-30.450	-26.829	$5.77e-15$
12	-32.880	-30.274	-26.377	$5.86e-15$

* *represents the optimum lag.*

Table A.3: Johansen test - Drift

	Trace statistic				Eigenvalue statistic			
H_0	test	10%	5%	1%	test	10%	5%	1%
$r = 0$	714.50	97.18	102.14	111.01	252.81	37.45	40.30	46.82
$r \leq 1$	461.69	71.86	76.07	84.45	122.13	31.66	34.40	39.79
$r \leq 2$	339.56	49.65	53.12	60.16	107.54	25.56	28.14	33.24
$r \leq 3$	232.02	32.00	34.91	41.07	86.01	19.77	22.00	26.81
$r \leq 4$	146.01	17.85	19.96	24.60	77.43	13.75	15.67	20.20
$r \leq 5$	68.57	7.52	9.24	12.97	68.57	7.52	9.24	12.97

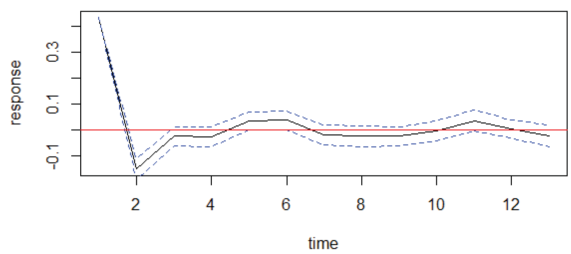
Table A.4: Johansen test - Drift and trend

	Trace statistic				Eigenvalue statistic			
H_0	test	10%	5%	1%	test	10%	5%	1%
$r = 0$	715.75	110.42	114.90	124.75	253.83	40.91	43.97	49.51
$r \leq 1$	461.92	83.20	87.31	96.58	122.22	34.75	37.52	42.36
$r \leq 2$	339.70	59.14	62.99	70.05	107.54	29.12	31.46	36.65
$r \leq 3$	232.15	39.06	42.44	48.45	86.12	23.11	25.54	30.34
$r \leq 4$	146.03	22.76	25.32	30.45	77.47	16.85	18.96	23.65
$r \leq 5$	68.56	10.49	12.25	16.26	68.56	10.49	12.25	16.26

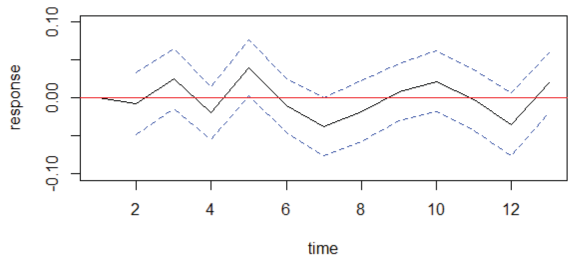
Table A.5: Stability test

Eigenvalues	Modulus
0.10250844+0.7234815i	0.73070750
0.10250844-0.7234815i	0.73070750
0.51047888+0.4540412i	0.68318528
0.51047888-0.4540412i	0.68318528
-0.49890695+0.4631509i	0.68074731
-0.49890695-0.4631509i	0.68074731
-0.53342036+0.3928048i	0.66244464
-0.53342036-0.3928048i	0.66244464
0.63876227+0.0000000i	0.63876227
0.30767224+0.5583973i	0.63754981
0.30767224-0.5583973i	0.63754981
-0.60855377+0.0000000i	0.60855377
-0.27103870+0.5417273i	0.60574782
-0.27103870-0.5417273i	0.60574782
-0.06112912+0.5892542i	0.59241646
-0.06112912-0.5892542i	0.59241646
0.43903196+0.2205039i	0.49129525
0.43903196-0.2205039i	0.49129525
-0.45435546+0.0000000i	0.45435546
-0.32846336+0.0000000i	0.32846336
-0.04582327+0.3095817i	0.31295463
-0.04582327-0.3095817i	0.31295463
0.22841460+0.0000000i	0.22841460
0.07183814+0.0000000i	0.07183814

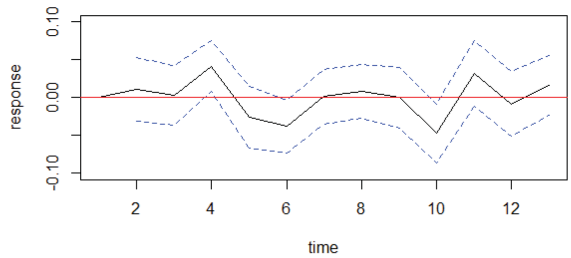
Figure A.1: Local Projections



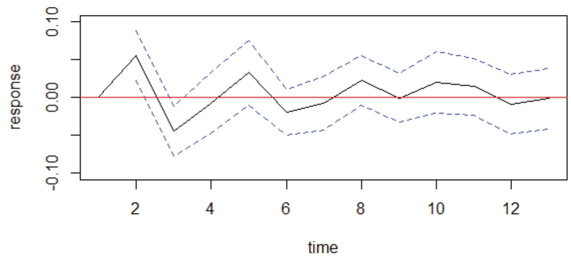
Response of IFDI to IFDI



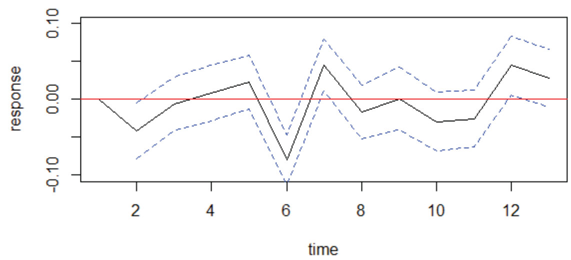
Response of IFDI to GDP



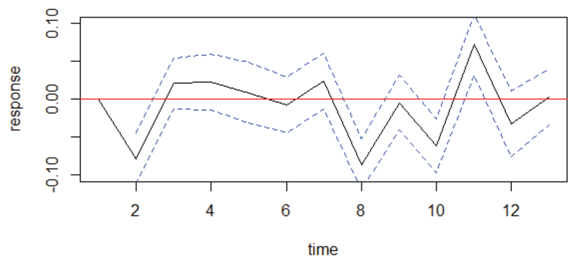
Response of IFDI to TO



Response of IFDI to PRR



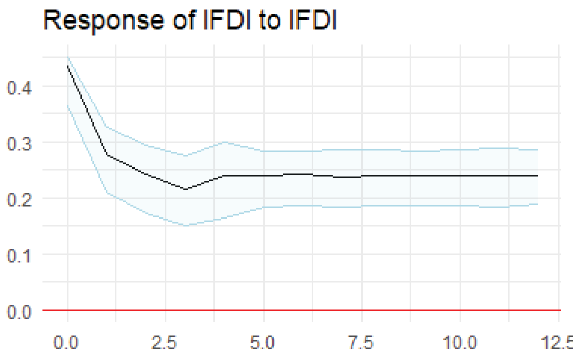
Response of IFDI to RER



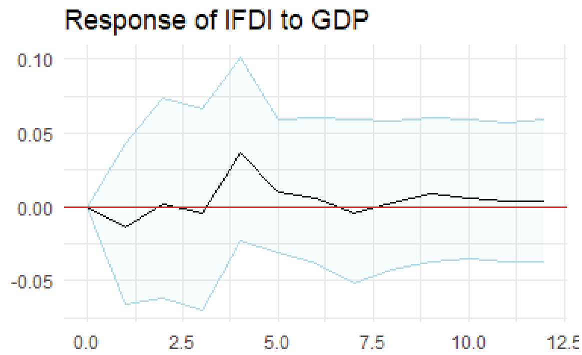
Response of IFDI to Selic

Source: Author's own elaboration.

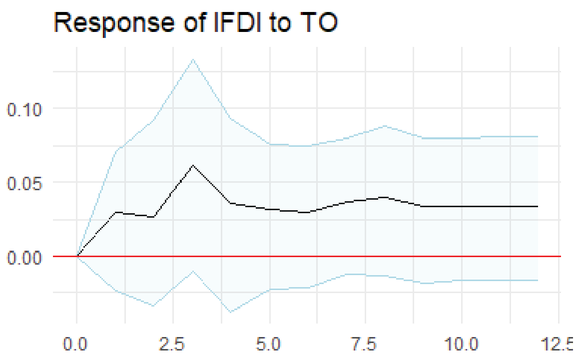
Figure A.2: Impulse Response Functions (Cumulated)



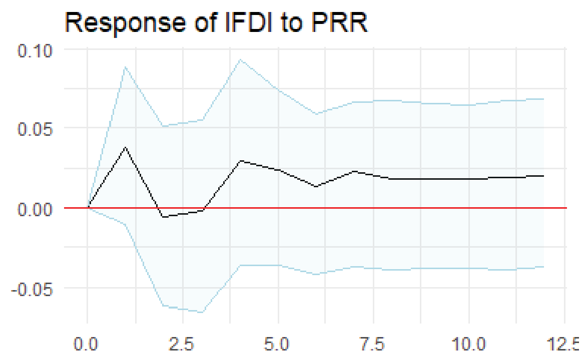
(a)



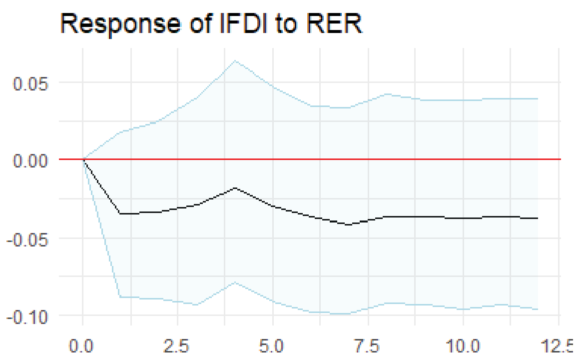
(b)



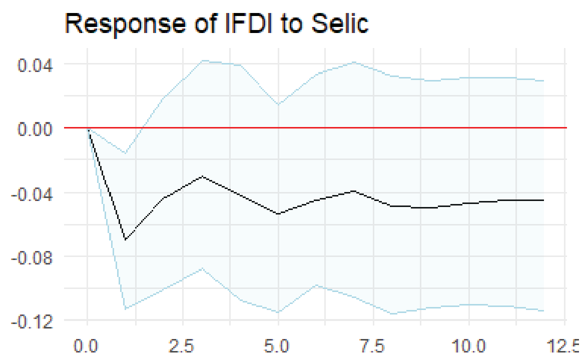
(c)



(d)



(e)



(f)

Source: Author's own elaboration.

APPENDIX B – ESSAY II

Table B.1: Top ten 2016 Products - Exports (HIIT)

HS-6 Code	HS-2 Description	Value
870421	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	353, 647, 206
220710	Beverages, spirits and vinegar	302, 524, 487
870431	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	228, 787, 434
390110	Plastics and articles thereof	134, 926, 423
870321	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	113, 743, 701
870829	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	113, 740, 502
271012	Mineral fuels, mineral oils, bituminous substances; mineral waxes	107, 247, 835
401120	Rubber and articles thereof	103, 874, 233
850300	Electrical machinery and equipment and parts thereof; others	89, 763, 328
840991	Nuclear reactors, boilers, machinery and mechanical appliances; others	81, 007, 366

Note: Monetary values on US$.
Source: Author's own elaboration

Table B.2: Top ten 2016 Products - Exports (VIIT-L)

HS-6 Code	HS-2 Description	Value
870323	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	1, 532, 562, 890
870322	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	744, 085, 464
840999	Nuclear reactors, boilers, machinery and mechanical appliances; others	315, 215, 176
850300	Electrical machinery and equipment and parts thereof; others	124, 683, 694
300439	Pharmaceutical products	97, 331, 242
870850	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	82, 005, 337
848310	Nuclear reactors, boilers, machinery and mechanical appliances; others	81, 651, 932
870840	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	75, 493, 226
870899	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	74, 012, 352
841430	Nuclear reactors, boilers, machinery and mechanical appliances; others	68, 662, 464

Note: Monetary values on US$.
Source: Author's own elaboration

Table B.3: Top ten 2016 Products - Exports (VIIT-H)

HS-6 Code	HS-2 Description	Value
870421	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	967, 161, 539
271012	Mineral fuels, mineral oils, bituminous substances; mineral waxes	397, 832, 226
220710	Beverages, spirits and vinegar	266, 002, 477
870321	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	160, 588, 167
300490	Pharmaceutical products	102, 772, 942
851762	Electrical machinery and equipment and parts thereof; others	93, 123, 373
390120	Plastics and articles thereof	79, 423, 351
870431	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	73, 375, 594
841430	Nuclear reactors, boilers, machinery and mechanical appliances; others	67, 562, 275
848340	Nuclear reactors, boilers, machinery and mechanical appliances; others	58, 345, 394

Note: Monetary values on US$.
Source: Author's own elaboration

Table B.4: Top ten 2016 Products - Imports (HIIT)

HS-6 Code	HS-2 Description	Value
870421	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	967,161,539
271012	Mineral fuels, mineral oils, bituminous substances; mineral waxes	397,832,226
220710	Beverages, spirits and vinegar	266,002,477
870321	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	160,588,167
300490	Pharmaceutical products	102,772,942
851762	Electrical machinery and equipment and parts thereof; others	93,123,373
390120	Plastics and articles thereof	79,423,351
870431	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	73,375,594
841430	Nuclear reactors, boilers, machinery and mechanical appliances; others	67,562,275
848340	Nuclear reactors, boilers, machinery and mechanical appliances; others	58,345,394

Note: Monetary values on US$.
Source: Author's own elaboration

Table B.5: Top ten 2016 Products - Imports (VIIT-L)

HS-6 Code	HS-2 Description	Value
870323	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	342,417,379
870322	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	242,006,433
870840	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	168,323,429
840999	Nuclear reactors, boilers, machinery and mechanical appliances; others	141,081,268
848310	Nuclear reactors, boilers, machinery and mechanical appliances; others	138,136,961
843149	Nuclear reactors, boilers, machinery and mechanical appliances; others	76,774,485
392690	Plastics and articles thereof	70,611,738
392010	Plastics and articles thereof	63,464,377
840991	Nuclear reactors, boilers, machinery and mechanical appliances; others	62,425,885
732690	Articles of iron or steel	59,781,350

Note: Monetary values on US$.
Source: Author's own elaboration

Table B.6: Top ten 2016 Products - Imports (VIIT-H)

HS-6 Code	HS-2 Description	Value
841191	Nuclear reactors, boilers, machinery and mechanical appliances; others	1, 344, 716, 755
880330	Aircraft, spacecraft, and parts thereof	334, 952, 733
903289	Optical, photographic, cinematographic instruments; others	176, 147, 573
390110	Plastics and articles thereof	112, 771, 500
903180	Optical, photographic, cinematographic instruments; others	85, 973, 094
293339	Organic chemicals	81, 674, 914
848180	Nuclear reactors, boilers, machinery and mechanical appliances; others	73, 727, 197
380891	Miscellaneous chemical products	72, 546, 358
880230	Aircraft, spacecraft, and parts thereof	68, 436, 428
840991	Nuclear reactors, boilers, machinery and mechanical appliances; others	57, 961, 550

Note: Monetary values on US$.
Source: Author's own elaboration

Table B.7: Top ten 2016 Products - Total Trade (HIIT)

HS-6 Code	HS-2 Description	Value
870421	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	1, 320, 808, 745
220710	Beverages, spirits and vinegar	568, 526, 964
271012	Mineral fuels, mineral oils, bituminous substances; mineral waxes	505, 080, 061
870431	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	302, 163, 028
870321	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	274, 331, 868
390110	Plastics and articles thereof	184, 242, 389
870829	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	152, 118, 228
390120	Plastics and articles thereof	134, 315, 647
401120	Rubber and articles thereof	131, 405, 190
401110	Rubber and articles thereof	125, 859, 139

Note: Monetary values on US$.
Source: Author's own elaboration

Table B.8: Top ten 2016 Products - Total Trade (VIIT-L)

HS-6 Code	HS-2 Description	Value
870323	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	1,874,980,269
870322	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	986,091,897
840999	Nuclear reactors, boilers, machinery and mechanical appliances; others	456,296,444
870840	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	243,816,656
848310	Nuclear reactors, boilers, machinery and mechanical appliances; others	219,788,893
850300	Electrical machinery and equipment and parts thereof; others	146,797,366
300439	Pharmaceutical products	139,517,950
870850	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	136,222,998
870899	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	123,341,832
840991	Nuclear reactors, boilers, machinery and mechanical appliances; others	113,471,898

Note: Monetary values on US$.
Source: Author's own elaboration

Table B.9: Top ten 2016 Products - Total Trade (VIIT-H)

HS-6 Code	HS-2 Description	Value
841191	Nuclear reactors, boilers, machinery and mechanical appliances; others	$2,757,558,985$
880330	Aircraft, spacecraft, and parts thereof	$510,317,133$
880230	Aircraft, spacecraft, and parts thereof	$477,733,634$
903289	Optical, photographic, cinematographic instruments; others	$223,772,226$
842139	Nuclear reactors, boilers, machinery and mechanical appliances; others	$148,724,893$
390110	Plastics and articles thereof	$137,454,517$
840991	Nuclear reactors, boilers, machinery and mechanical appliances; others	$124,308,674$
300490	Pharmaceutical products	$122,363,829$
293339	Organic chemicals	$114,309,956$
903180	Optical, photographic, cinematographic instruments; others	$103,384,876$

Note: Monetary values on US$.
Source: Author's own elaboration

Table B.10: Top ten 2016 Partners - Exports

HIIT		VIIT-L		VIIT-H	
Argentina	1,415,440,792.000	Argentina	2,778,943,643.000	United States	2,446,503,257.000
United States	653,099,345.000	United States	1,616,543,211.000	China	577,114,612.000
Germany	162,568,278.000	Germany	297,804,794.000	Argentina	403,041,520.000
France	42,281,115.000	Spain	113,814,092.000	France	138,033,410.000
Colombia	31,683,157.000	Denmark	113,392,257.000	Germany	123,827,906.000
Chile	22,611,164.000	Belgium	89,511,296.000	Colombia	51,959,231.000
Spain	22,198,111.000	China	74,503,811.000	India	39,815,988.000
China	18,286,990.000	France	70,467,223.000	Spain	37,487,160.000
India	11,559,048.000	Colombia	62,451,023.000	Chile	32,725,770.000
South Africa	4,990,966.000	Canada	40,122,615.000	Canada	22,997,760.000

Note: Monetary values on US$.
Source: Author's own elaboration

Table B.11: Top ten 2016 Partners - Imports

HIIT		VIIT-L		VIIT-H	
Argentina	1, 678, 162, 652.000	United States	1, 945, 812, 420.000	United States	2, 635, 545, 102.000
United States	1, 093, 489, 633.000	Argentina	1, 067, 324, 877.000	China	497, 059, 648.000
France	198, 060, 048.000	Germany	384, 770, 134.000	Argentina	350, 548, 979.000
Germany	103, 415, 592.000	Spain	135, 272, 987.000	Germany	237, 563, 858.000
China	86, 853, 075.000	France	107, 448, 794.000	France	221, 727, 536.000
Colombia	46, 130, 083.000	China	98, 265, 141.000	Spain	101, 172, 798.000
Spain	35, 317, 908.000	Belgium	70, 938, 579.000	India	77, 328, 407.000
India	23, 573, 615.000	Denmark	69, 196, 628.000	Colombia	71, 324, 070.000
Chile	7, 758, 521.000	Colombia	43, 299, 616.000	Belgium	31, 083, 548.000
Austria	5, 665, 707.000	Canada	41, 887, 245.000	Denmark	31, 052, 329.000

Note: Monetary values on US$.
Source: Author's own elaboration

Table B.12: Top ten 2016 Partners - Total Trade

HIIT		VIIT-L		VIIT-H	
Argentina	3, 093, 603, 444.000	Argentina	3, 846, 268, 520.000	United States	5, 082, 048, 359.000
United States	1, 746, 588, 977.000	United States	3, 562, 355, 631.000	China	1, 074, 174, 259.000
Germany	265, 983, 870.000	Germany	682, 574, 928.000	Argentina	753, 590, 499.000
France	240, 341, 163.000	Spain	249, 087, 079.000	Germany	361, 391, 763.000
China	105, 140, 066.000	Denmark	182, 588, 885.000	France	359, 760, 945.000
Colombia	77, 813, 240.000	France	177, 916, 017.000	Spain	138, 659, 958.000
Spain	57, 516, 019.000	China	172, 768, 952.000	Colombia	123, 283, 301.000
India	35, 132, 663.000	Belgium	160, 449, 875.000	India	117, 144, 395.000
Chile	30, 369, 685.000	Colombia	105, 750, 639.000	Chile	53, 912, 470.000
Canada	9, 392, 306.000	Canada	82, 009, 860.000	Canada	50, 185, 284.000

Note: Monetary values on US$.
Source: Author's own elaboration

Table B.13: VIIT-L (γ = 15%/α = 15%)

	Dependent variable:		
	$lnExports(X)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.580^{***}	0.121	-0.175
	(0.220)	(0.123)	(0.111)
$lnGDP_i$	0.669^{***}	1.283^{***}	0.587^{***}
	(0.007)	(0.072)	(0.010)
$lnDist_i$	-1.143^{***}	-	-1.001^{***}
	(0.033)		(0.046)
$Border_i$	0.409^{***}	-	0.490^{***}
	(0.056)		(0.080)
ADP	0.001	-0.009^{***}	-0.005^{***}
	(0.002)	(0.001)	(0.001)
CVD	-0.029	-0.033^{**}	-0.020
	(0.028)	(0.014)	(0.013)
SG	-0.173^{***}	-0.175^{***}	-0.198^{***}
	(0.049)	(0.024)	(0.024)
SPS	0.0003	0.001^{***}	0.001^{***}
	(0.0004)	(0.0002)	(0.0002)
TBT	0.001	-0.001^{***}	-0.001^{*}
	(0.001)	(0.0004)	(0.0004)
$Duty$	-0.099^{***}	-0.028^{***}	-0.064^{***}
	(0.002)	(0.002)	(0.002)
$lnIFDI$	0.458^{***}	0.121^{***}	0.238^{***}
	(0.042)	(0.022)	(0.021)
$Constant$	43.277^{***}	-	6.119^{**}
	(5.823)		(2.966)
Observations	62,269	62,269	62,269
R^2	0.206	0.046	0.371

Source: Author's own elaboration.

Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.14: VIIT-H (γ = 15%/α = 15%)

	Dependent variable:		
	$lnExports(X)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-0.906^{***}	0.455^{***}	0.412^{***}
	(0.235)	(0.142)	(0.126)
$lnGDP_i$	0.547^{***}	1.691^{***}	0.535^{***}
	(0.007)	(0.061)	(0.010)
$lnDist_i$	-0.641^{***}	-	-0.594^{***}
	(0.030)		(0.042)
$Border_i$	1.330^{***}	-	1.158^{***}
	(0.052)		(0.075)
ADP	0.002	-0.007^{***}	-0.002^{**}
	(0.002)	(0.001)	(0.001)
CVD	-0.002	-0.041^{**}	-0.015
	(0.030)	(0.016)	(0.015)
SG	-0.112^{**}	-0.160^{***}	-0.175^{***}
	(0.054)	(0.028)	(0.027)
SPS	-0.0003	0.0001	0.0002
	(0.0004)	(0.0002)	(0.0002)
TBT	0.002^{**}	-0.001^{**}	-0.0002
	(0.001)	(0.0005)	(0.0005)
$Duty$	-0.093^{***}	-0.007^{**}	-0.059^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.471^{***}	0.089^{***}	0.255^{***}
	(0.045)	(0.026)	(0.024)
$Constant$	22.579^{***}	-	-13.079^{***}
	(6.215)		(3.361)
Observations	54,161	54,161	54,161
R^2	0.186	0.087	0.384

Source: Author's own elaboration.
Note: Standard errors in parentheses. *p<0.1; **p<0.05; ***p<0.01

Table B.15: HIIT (γ = 15%/α = 15%)

	Dependent variable:		
	$lnExports(X)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.051^{**}	0.355	-0.221
	(0.449)	(0.274)	(0.232)
$lnGDP_i$	0.634^{***}	1.467^{***}	0.582^{***}
	(0.014)	(0.153)	(0.017)
$lnDist_i$	-1.229^{***}	-	-1.046^{***}
	(0.062)		(0.076)
$Border_i$	0.884^{***}	-	0.737^{***}
	(0.100)		(0.126)
ADP	-0.005	-0.012^{***}	-0.007^{***}
	(0.004)	(0.002)	(0.002)
CVD	-0.139^{**}	-0.023	-0.033
	(0.058)	(0.030)	(0.028)
SG	-0.278^{***}	-0.276^{***}	-0.315^{***}
	(0.104)	(0.054)	(0.051)
SPS	0.0003	0.002^{***}	0.001^{***}
	(0.001)	(0.0004)	(0.0004)
TBT	0.001	-0.002^{**}	-0.001
	(0.002)	(0.001)	(0.001)
$Duty$	-0.094^{***}	-0.012^{*}	-0.077^{***}
	(0.003)	(0.006)	(0.003)
$lnIFDI$	0.450^{***}	0.076	0.302^{***}
	(0.086)	(0.050)	(0.045)
$Constant$	30.843^{***}	-	8.182
	(11.904)		(6.184)
Observations	14,555	14,555	14,555
R^2	0.233	0.106	0.388

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.16: VIIT-L ($\gamma = 15\%/\alpha = 15\%$)

	Dependent variable:		
	$lnImports(M)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.498^{***}	0.200^{*}	-0.340^{***}
	(0.220)	(0.119)	(0.108)
$lnGDP_i$	0.705^{***}	0.849^{***}	0.627^{***}
	(0.007)	(0.070)	(0.010)
$lnDist_i$	-1.021^{***}	-	-0.865^{***}
	(0.033)		(0.047)
$Border_i$	0.299^{***}	-	0.352^{***}
	(0.056)		(0.080)
ADP	0.003^{*}	-0.003^{***}	0.0001
	(0.002)	(0.001)	(0.001)
CVD	-0.033	-0.046^{***}	-0.038^{***}
	(0.028)	(0.013)	(0.013)
SG	-0.186^{***}	-0.159^{***}	-0.180^{***}
	(0.050)	(0.024)	(0.023)
SPS	0.0003	0.0001	0.0001
	(0.0004)	(0.0002)	(0.0002)
TBT	0.001	-0.0001	0.001
	(0.001)	(0.0004)	(0.0004)
$Duty$	-0.099^{***}	-0.022^{***}	-0.061^{***}
	(0.002)	(0.002)	(0.002)
$lnIFDI$	0.437^{***}	0.290^{***}	0.386^{***}
	(0.042)	(0.022)	(0.021)
$Constant$	39.161^{***}	-	6.824^{**}
	(5.846)		(2.884)
Observations	62,269	62,269	62,269
R^2	0.209	0.063	0.382

Source: Author's own elaboration.
Note: Standard errors in parentheses.
$^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table B.17: VIIT-H (γ = 15%/α = 15%)

	Dependent variable:		
	$lnImports(M)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-0.977^{***}	0.339^{**}	0.281^{**}
	(0.242)	(0.145)	(0.130)
$lnGDP_i$	0.594^{***}	1.786^{***}	0.605^{***}
	(0.007)	(0.062)	(0.010)
$lnDist_i$	-0.541^{***}	-	-0.491^{***}
	(0.031)		(0.044)
$Border_i$	1.213^{***}	-	1.053^{***}
	(0.054)		(0.078)
ADP	0.005^{**}	-0.003^{***}	0.002^{*}
	(0.002)	(0.001)	(0.001)
CVD	-0.014	-0.072^{***}	-0.043^{***}
	(0.031)	(0.016)	(0.016)
SG	-0.101^{*}	-0.123^{***}	-0.145^{***}
	(0.056)	(0.029)	(0.028)
SPS	-0.0004	-0.0004^{*}	-0.0002
	(0.0004)	(0.0002)	(0.0002)
TBT	0.003^{***}	-0.0001	0.001
	(0.001)	(0.0005)	(0.0005)
$Duty$	-0.098^{***}	-0.006^{**}	-0.062^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.505^{***}	0.218^{***}	0.373^{***}
	(0.046)	(0.026)	(0.025)
$Constant$	22.242^{***}	-	-13.326^{***}
	(6.415)		(3.459)
Observations	54,161	54,161	54,161
R^2	0.183	0.113	0.385

Source: Author's own elaboration.
Note: Standard errors in parentheses.
$^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table B.18: HIIT (γ = 15%/α = 15%)

	Dependent variable:		
	$lnImports(M)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.285^{***}	0.771^{***}	-0.369
	(0.456)	(0.280)	(0.238)
$lnGDP_i$	0.677^{***}	0.835^{***}	0.621^{***}
	(0.015)	(0.156)	(0.018)
$lnDist_i$	-1.157^{***}	-	-0.984^{***}
	(0.063)		(0.077)
$Border_i$	0.724^{***}	-	0.534^{***}
	(0.102)		(0.128)
ADP	-0.002	-0.009^{***}	-0.004^{*}
	(0.004)	(0.002)	(0.002)
CVD	-0.147^{**}	-0.095^{***}	-0.099^{***}
	(0.059)	(0.030)	(0.029)
SG	-0.300^{***}	-0.272^{***}	-0.293^{***}
	(0.106)	(0.055)	(0.052)
SPS	-0.0001	0.001	0.0003
	(0.001)	(0.0004)	(0.0004)
TBT	0.002	-0.002^{*}	0.0001
	(0.002)	(0.001)	(0.001)
$Duty$	-0.099^{***}	-0.003	-0.077^{***}
	(0.003)	(0.006)	(0.003)
$lnIFDI$	0.494^{***}	0.238^{***}	0.449^{***}
	(0.087)	(0.051)	(0.046)
$Constant$	35.272^{***}	-	9.309
	(12.080)		(6.327)
Observations	14,555	14,555	14,555
R^2	0.224	0.109	0.391

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.19: VIIT-L (γ = 15%/α = 15%)

	Dependent variable:		
	$lnTotalTrade(TT)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.531^{***}	0.180^{*}	-0.172^{*}
	(0.215)	(0.109)	(0.099)
$lnGDP_i$	0.688^{***}	1.056^{***}	0.610^{***}
	(0.006)	(0.063)	(0.010)
$lnDist_i$	-1.084^{***}	-	-0.936^{***}
	(0.032)		(0.046)
$Border_i$	0.349^{***}	-	0.422^{***}
	(0.055)		(0.079)
ADP	0.002	-0.005^{***}	-0.003^{***}
	(0.002)	(0.001)	(0.001)
CVD	-0.030	-0.038^{***}	-0.028^{**}
	(0.028)	(0.012)	(0.012)
SG	-0.175^{***}	-0.164^{***}	-0.185^{***}
	(0.048)	(0.021)	(0.021)
SPS	0.0003	0.0005^{***}	0.0005^{***}
	(0.0003)	(0.0002)	(0.0002)
TBT	0.001	-0.001^{**}	-0.0002
	(0.001)	(0.0004)	(0.0003)
$Duty$	-0.099^{***}	-0.025^{***}	-0.059^{***}
	(0.002)	(0.002)	(0.002)
$lnIFDI$	0.446^{***}	0.204^{***}	0.300^{***}
	(0.041)	(0.020)	(0.019)
$Constant$	41.856^{***}	-	4.921^{*}
	(5.702)		(2.650)
Observations	62,269	62,269	62,269
R^2	0.215	0.064	0.439

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.20: VIIT-H (γ = 15%/α = 15%)

	Dependent variable:		
	$lnTotalTrade(TT)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-0.950^{***}	0.389^{***}	0.437^{***}
	(0.233)	(0.129)	(0.117)
$lnGDP_i$	0.572^{***}	1.768^{***}	0.579^{***}
	(0.007)	(0.055)	(0.010)
$lnDist_i$	-0.590^{***}	-	-0.548^{***}
	(0.029)		(0.042)
$Border_i$	1.265^{***}	-	1.104^{***}
	(0.052)		(0.075)
ADP	0.004^{**}	-0.005^{***}	-0.0005
	(0.002)	(0.001)	(0.001)
CVD	-0.009	-0.060^{***}	-0.032^{**}
	(0.030)	(0.015)	(0.014)
SG	-0.109^{**}	-0.143^{***}	-0.164^{***}
	(0.053)	(0.026)	(0.025)
SPS	-0.0004	-0.0001	0.00003
	(0.0004)	(0.0002)	(0.0002)
TBT	0.003^{***}	-0.0005	0.0002
	(0.001)	(0.0004)	(0.0004)
$Duty$	-0.096^{***}	-0.007^{***}	-0.057^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.489^{***}	0.154^{***}	0.303^{***}
	(0.044)	(0.024)	(0.022)
$Constant$	23.422^{***}	-	-15.042^{***}
	(6.176)		(3.114)
Observations	54,161	54,161	54,161
R^2	0.190	0.121	0.446

Source: Author’s own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.21: HIIT (γ = 15%/α = 15%)

	Dependent variable:		
	$lnTotalTrade(TT)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.175^{***}	0.508^{**}	-0.240
	(0.443)	(0.244)	(0.210)
$lnGDP_i$	0.656^{***}	1.151^{***}	0.606^{***}
	(0.014)	(0.136)	(0.017)
$lnDist_i$	-1.194^{***}	-	-1.015^{***}
	(0.062)		(0.075)
$Border_i$	0.798^{***}	-	0.640^{***}
	(0.099)		(0.125)
ADP	-0.003	-0.010^{***}	-0.005^{***}
	(0.004)	(0.002)	(0.002)
CVD	-0.138^{**}	-0.056^{**}	-0.061^{**}
	(0.057)	(0.026)	(0.025)
SG	-0.290^{***}	-0.274^{***}	-0.305^{***}
	(0.103)	(0.048)	(0.046)
SPS	0.0001	0.001^{***}	0.001^{***}
	(0.001)	(0.0004)	(0.0003)
TBT	0.002	-0.002^{**}	-0.0004
	(0.002)	(0.001)	(0.001)
$Duty$	-0.096^{***}	-0.007	-0.073^{***}
	(0.003)	(0.005)	(0.003)
$lnIFDI$	0.472^{***}	0.165^{***}	0.366^{***}
	(0.085)	(0.044)	(0.040)
$Constant$	34.065^{***}	-	7.947
	(11.728)		(5.604)
Observations	14,555	14,555	14,555
R^2	0.236	0.130	0.449

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.22: VIIT-L (γ = 15%/α = 25%)

	Dependent variable:		
	$lnExports(X)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.569^{***}	0.132	-0.213^{*}
	(0.229)	(0.131)	(0.118)
$lnGDP_i$	0.667^{***}	1.252^{***}	0.584^{***}
	(0.007)	(0.077)	(0.010)
$lnDist_i$	-1.151^{***}	-	-1.027^{***}
	(0.035)		(0.048)
$Border$	0.257^{***}	-	0.389^{***}
	(0.059)		(0.083)
ADP	0.002	-0.009^{***}	-0.005^{***}
	(0.002)	(0.001)	(0.001)
CVD	-0.016	-0.043^{***}	-0.025^{*}
	(0.029)	(0.015)	(0.014)
SG	-0.151^{***}	-0.174^{***}	-0.194^{***}
	(0.052)	(0.026)	(0.025)
SPS	0.0001	0.001^{***}	0.001^{***}
	(0.0004)	(0.0002)	(0.0002)
TBT	0.001	-0.001^{***}	-0.001
	(0.001)	(0.0004)	(0.0004)
$Duty$	-0.100^{***}	-0.028^{***}	-0.065^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.448^{***}	0.121^{***}	0.240^{***}
	(0.044)	(0.024)	(0.023)
$Constant$	43.185^{***}	-	7.458^{**}
	(6.084)		(3.150)
Observations	56,481	56,481	56,481
R^2	0.205	0.044	0.375

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.23: VIIT-H (γ = 15%/α = 25%)

	Dependent variable:		
	$lnExports(X)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.037^{***}	0.461^{***}	0.373^{***}
	(0.241)	(0.149)	(0.132)
$lnGDP_i$	0.540^{***}	1.683^{***}	0.529^{***}
	(0.007)	(0.063)	(0.010)
$lnDist_i$	-0.586^{***}	-	-0.559^{***}
	(0.030)		(0.043)
$Border_i$	1.329^{***}	-	1.157^{***}
	(0.054)		(0.076)
ADP	0.003	-0.006^{***}	-0.002
	(0.002)	(0.001)	(0.001)
CVD	0.008	-0.038^{**}	-0.011
	(0.031)	(0.017)	(0.016)
SG	-0.123^{**}	-0.163^{***}	-0.180^{***}
	(0.056)	(0.030)	(0.029)
SPS	-0.0002	0.0002	0.0003
	(0.0004)	(0.0002)	(0.0002)
TBT	0.002^{***}	-0.001^{**}	-0.0002
	(0.001)	(0.0005)	(0.0005)
$Duty$	-0.092^{***}	-0.007^{**}	-0.059^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.485^{***}	0.087^{***}	0.261^{***}
	(0.046)	(0.027)	(0.025)
$Constant$	25.709^{***}	-	-12.248^{***}
	(6.390)		(3.507)
Observations	50,499	50,499	50,499
R^2	0.181	0.089	0.384

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.24: HIIT ($\gamma = 15\%/\alpha = 25\%$)

	Dependent variable:		
	$lnExports(X)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.057^{***}	0.523^{***}	0.043
	(0.354)	(0.200)	(0.175)
$lnGDP_i$	0.630^{***}	1.436^{***}	0.566^{***}
	(0.011)	(0.108)	(0.014)
$lnDist_i$	-1.173^{***}	-	-0.965^{***}
	(0.050)		(0.064)
$Border_i$	0.940^{***}	-	0.780^{***}
	(0.080)		(0.107)
ADP	-0.004	-0.011^{***}	-0.007^{***}
	(0.003)	(0.001)	(0.001)
CVD	-0.120^{***}	-0.030	-0.030
	(0.046)	(0.022)	(0.021)
SG	-0.276^{***}	-0.232^{***}	-0.277^{***}
	(0.081)	(0.040)	(0.038)
SPS	0.0004	0.001^{***}	0.001^{***}
	(0.001)	(0.0003)	(0.0003)
TBT	0.001	-0.001^{**}	-0.0005
	(0.001)	(0.001)	(0.001)
$Duty$	-0.094^{***}	-0.017^{***}	-0.072^{***}
	(0.002)	(0.004)	(0.003)
$lnIFDI$	0.464^{***}	0.070^{*}	0.268^{***}
	(0.068)	(0.036)	(0.033)
$Constant$	30.386^{***}		0.639
	(9.389)		(4.652)
Observations	24,005	24,005	24,005
R^2	0.226	0.093	0.403

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.25: VIIT-L (γ = 15%/α = 25%)

	Dependent variable:		
	$lnImports(M)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.476^{***}	0.229^{*}	-0.369^{***}
	(0.230)	(0.127)	(0.114)
$lnGDP_i$	0.702^{***}	0.784^{***}	0.622^{***}
	(0.007)	(0.075)	(0.010)
$lnDist_i$	-1.032^{***}	-	-0.896^{***}
	(0.035)		(0.048)
$Border_i$	0.130^{**}	-	0.227^{***}
	(0.059)		(0.083)
ADP	0.003^{*}	-0.003^{***}	0.0001
	(0.002)	(0.001)	(0.001)
CVD	-0.025	-0.049^{***}	-0.040^{***}
	(0.029)	(0.014)	(0.014)
SG	-0.161^{***}	-0.156^{***}	-0.173^{***}
	(0.052)	(0.025)	(0.024)
SPS	0.00003	0.0001	-0.00000
	(0.0004)	(0.0002)	(0.0002)
TBT	0.001	-0.0001	0.001
	(0.001)	(0.0004)	(0.0004)
$Duty$	-0.100^{***}	-0.023^{***}	-0.062^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.425^{***}	0.291^{***}	0.388^{***}
	(0.044)	(0.023)	(0.022)
$Constant$	38.859^{***}	-	8.002^{***}
	(6.097)		(3.056)
Observations	56,481	56,481	56,481
R^2	0.210	0.060	0.386

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.26: VIIT-H (γ = 15%/α = 25%)

	Dependent variable:		
	$lnImports(M)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.120^{***}	0.312^{**}	0.244^{*}
	(0.250)	(0.152)	(0.136)
$lnGDP_i$	0.588^{***}	1.817^{***}	0.601^{***}
	(0.008)	(0.064)	(0.010)
$lnDist_i$	-0.489^{***}	-	-0.460^{***}
	(0.031)		(0.044)
$Border_i$	1.212^{***}	-	1.054^{***}
	(0.056)		(0.079)
ADP	0.006^{***}	-0.002^{**}	0.002^{**}
	(0.002)	(0.001)	(0.001)
CVD	-0.007	-0.078^{***}	-0.046^{***}
	(0.032)	(0.017)	(0.017)
SG	-0.115^{**}	-0.127^{***}	-0.153^{***}
	(0.058)	(0.031)	(0.030)
SPS	-0.0003	-0.0003	-0.0002
	(0.0004)	(0.0002)	(0.0002)
TBT	0.003^{***}	-0.00004	0.001
	(0.001)	(0.001)	(0.0005)
$Duty$	-0.097^{***}	-0.007^{**}	-0.062^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.521^{***}	0.224^{***}	0.384^{***}
	(0.047)	(0.028)	(0.026)
$Constant$	25.685^{***}	-	-12.614^{***}
	(6.612)		(3.612)
Observations	50,499	50,499	50,499
R^2	0.179	0.117	0.385

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.27: HIIT (γ = 15%/α = 25%)

	Dependent variable:		
	$lnImports(M)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.198^{***}	0.877^{***}	-0.052
	(0.359)	(0.204)	(0.179)
$lnGDP_i$	0.674^{***}	0.949^{***}	0.610^{***}
	(0.011)	(0.111)	(0.015)
$lnDist_i$	-1.072^{***}	-	-0.855^{***}
	(0.050)		(0.065)
$Border$	0.829^{***}	-	0.647^{***}
	(0.081)		(0.109)
ADP	-0.0005	-0.007^{***}	-0.003^{*}
	(0.003)	(0.002)	(0.001)
CVD	-0.111^{**}	-0.078^{***}	-0.073^{***}
	(0.046)	(0.022)	(0.021)
SG	-0.290^{***}	-0.252^{***}	-0.282^{***}
	(0.082)	(0.041)	(0.039)
SPS	-0.00001	-0.00004	-0.0001
	(0.001)	(0.0003)	(0.0003)
TBT	0.002	-0.001	0.001
	(0.001)	(0.001)	(0.001)
$Duty$	-0.098^{***}	-0.007	-0.071^{***}
	(0.002)	(0.004)	(0.003)
$lnIFDI$	0.492^{***}	0.199^{***}	0.393^{***}
	(0.069)	(0.037)	(0.034)
$Constant$	32.089^{***}	-	-0.081
	(9.513)		(4.764)
Observations	24,005	24,005	24,005
R^2	0.219	0.100	0.407
Source:			Author's own elaboration.
Note:			Standard errors in parentheses.
			*p<0.1; **p<0.05; ***p<0.01

Table B.28: VIIT-L (γ = 15%/α = 25%)

	Dependent variable:		
	$lnTotalTrade(TT)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.515^{***}	0.199^{*}	-0.204^{*}
	(0.224)	(0.116)	(0.105)
$lnGDP_i$	0.685^{***}	1.009^{***}	0.606^{***}
	(0.007)	(0.068)	(0.010)
$lnDist_i$	-1.094^{***}	-	-0.964^{***}
	(0.034)		(0.047)
$Border_i$	0.189^{***}	-	0.311^{***}
	(0.058)		(0.082)
ADP	0.003	-0.006^{***}	-0.003^{***}
	(0.002)	(0.001)	(0.001)
CVD	-0.019	-0.044^{***}	-0.031^{**}
	(0.029)	(0.013)	(0.013)
SG	-0.151^{***}	-0.161^{***}	-0.179^{***}
	(0.050)	(0.023)	(0.022)
SPS	0.0001	0.0004^{**}	0.0004^{**}
	(0.0004)	(0.0002)	(0.0002)
TBT	0.001	-0.001^{*}	-0.0001
	(0.001)	(0.0004)	(0.0004)
$Duty$	-0.100^{***}	-0.025^{***}	-0.061^{***}
	(0.002)	(0.002)	(0.002)
$lnIFDI$	0.435^{***}	0.204^{***}	0.302^{***}
	(0.043)	(0.021)	(0.020)
$Constant$	41.648^{***}	-	6.144^{**}
	(5.951)		(2.813)
Observations	56,481	56,481	56,481
R^2	0.215	0.061	0.443

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.29: VIIT-H (γ = 15%/α = 25%)

	Dependent variable:		
	$lnTotalTrade(TT)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.088^{***}	0.368^{***}	0.395^{***}
	(0.240)	(0.136)	(0.122)
$lnGDP_i$	0.565^{***}	1.780^{***}	0.575^{***}
	(0.007)	(0.057)	(0.010)
$lnDist_i$	-0.537^{***}	-	-0.516^{***}
	(0.030)		(0.043)
$Border_i$	1.264^{***}	-	1.104^{***}
	(0.053)		(0.077)
ADP	0.004^{**}	-0.004^{***}	0.0001
	(0.002)	(0.001)	(0.001)
CVD	-0.001	-0.060^{***}	-0.031^{**}
	(0.031)	(0.015)	(0.015)
SG	-0.121^{**}	-0.146^{***}	-0.170^{***}
	(0.055)	(0.027)	(0.027)
SPS	-0.0002	-0.0001	0.0001
	(0.0004)	(0.0002)	(0.0002)
TBT	0.003^{***}	-0.0005	0.0003
	(0.001)	(0.0005)	(0.0004)
$Duty$	-0.095^{***}	-0.007^{***}	-0.057^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.504^{***}	0.158^{***}	0.311^{***}
	(0.046)	(0.025)	(0.023)
$Constant$	26.763^{***}	-	-14.159^{***}
	(6.357)		(3.253)
Observations	50,499	50,499	50,499
R^2	0.186	0.125	0.446

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.30: HIIT (γ = 15%/α = 25%)

	Dependent variable:		
	$lnTotalTrade(TT)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.127^{***}	0.683^{***}	0.097
	(0.349)	(0.178)	(0.158)
$lnGDP_i$	0.653^{***}	1.203^{***}	0.593^{***}
	(0.011)	(0.097)	(0.014)
$lnDist_i$	-1.122^{***}	-	-0.909^{***}
	(0.049)		(0.063)
$Border$	0.879^{***}	-	0.719^{***}
	(0.079)		(0.106)
ADP	-0.002	-0.009^{***}	-0.005^{***}
	(0.003)	(0.001)	(0.001)
CVD	-0.113^{**}	-0.053^{***}	-0.050^{***}
	(0.045)	(0.019)	(0.019)
SG	-0.283^{***}	-0.241^{***}	-0.279^{***}
	(0.080)	(0.035)	(0.034)
SPS	0.0002	0.0005^{*}	0.0005^{*}
	(0.001)	(0.0003)	(0.0002)
TBT	0.002	-0.001^{*}	0.0001
	(0.001)	(0.001)	(0.001)
$Duty$	-0.096^{***}	-0.011^{***}	-0.067^{***}
	(0.002)	(0.004)	(0.002)
$lnIFDI$	0.477^{***}	0.135^{***}	0.314^{***}
	(0.067)	(0.032)	(0.030)
$Constant$	32.022^{***}	-	-1.767
	(9.242)		(4.218)
Observations	24,005	24,005	24,005
R^2	0.229	0.118	0.467

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.31: VIIT-L (γ = 25%/α = 15%)

	Dependent variable:		
	$lnExports(X)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.474^{***}	0.319^{**}	-0.147
	(0.254)	(0.137)	(0.123)
$lnGDP_i$	0.681^{***}	1.001^{***}	0.591^{***}
	(0.008)	(0.081)	(0.011)
$lnDist_i$	-1.107^{***}	-	-0.963^{***}
	(0.038)		(0.052)
$Border_i$	0.474^{***}	-	0.490^{***}
	(0.065)		(0.089)
ADP	0.002	-0.007^{***}	-0.003^{***}
	(0.002)	(0.001)	(0.001)
CVD	-0.026	-0.021	-0.011
	(0.033)	(0.015)	(0.015)
SG	-0.170^{***}	-0.162^{***}	-0.179^{***}
	(0.057)	(0.027)	(0.026)
SPS	0.001	0.001^{***}	0.001^{***}
	(0.0004)	(0.0002)	(0.0002)
TBT	0.001	-0.001^{***}	-0.001^{*}
	(0.001)	(0.0004)	(0.0004)
$Duty$	-0.098^{***}	-0.025^{***}	-0.063^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.412^{***}	0.115^{***}	0.234^{***}
	(0.049)	(0.025)	(0.024)
$Constant$	40.145^{***}	-	4.937
	(6.746)		(3.282)
Observations	46,225	46,225	46,225
R^2	0.209	0.049	0.376

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.32: VIIT-H (γ = 25%/α = 15%)

	Dependent variable:		
	$lnExports(X)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-0.920^{***}	0.321^{*}	0.262^{*}
	(0.273)	(0.164)	(0.145)
$lnGDP_i$	0.558^{***}	1.702^{***}	0.542^{***}
	(0.008)	(0.072)	(0.011)
$lnDist_i$	-0.639^{***}	-	-0.569^{***}
	(0.034)		(0.047)
$Border_i$	1.346^{***}	-	1.171^{***}
	(0.060)		(0.083)
ADP	0.003	-0.007^{***}	-0.002
	(0.002)	(0.001)	(0.001)
CVD	0.012	-0.045^{**}	-0.016
	(0.035)	(0.018)	(0.018)
SG	-0.088	-0.162^{***}	-0.169^{***}
	(0.062)	(0.033)	(0.031)
SPS	-0.0004	-0.0001	0.00002
	(0.0004)	(0.0002)	(0.0002)
TBT	0.003^{***}	-0.001	0.0003
	(0.001)	(0.001)	(0.001)
$Duty$	-0.094^{***}	-0.010^{***}	-0.063^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.480^{***}	0.153^{***}	0.312^{***}
	(0.052)	(0.030)	(0.028)
$Constant$	22.579^{***}	-	-9.810^{**}
	(7.222)		(3.846)
Observations	39,883	39,883	39,883
R^2	0.192	0.099	0.387

Source: Author's own elaboration.

Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.33: HIIT ($\gamma = 25\%/\alpha = 15\%$)

	Dependent variable:		
	$lnExports(X)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-0.946^{*}	0.848^{***}	0.099
	(0.515)	(0.302)	(0.255)
$lnGDP_i$	0.660^{***}	1.282^{***}	0.608^{***}
	(0.017)	(0.173)	(0.019)
$lnDist_i$	-1.191^{***}	-	-0.978^{***}
	(0.071)		(0.085)
$Border$	0.974^{***}	-	0.851^{***}
	(0.114)		(0.141)
ADP	-0.005	-0.013^{***}	-0.008^{***}
	(0.004)	(0.002)	(0.002)
CVD	-0.126^{*}	-0.028	-0.035
	(0.067)	(0.033)	(0.031)
SG	-0.216^{*}	-0.274^{***}	-0.289^{***}
	(0.119)	(0.059)	(0.055)
SPS	0.001	0.001^{**}	0.001^{**}
	(0.001)	(0.0004)	(0.0004)
TBT	0.001	-0.002^{**}	-0.001
	(0.002)	(0.001)	(0.001)
$Duty$	-0.094^{***}	-0.009	-0.075^{***}
	(0.004)	(0.007)	(0.004)
$lnIFDI$	0.412^{***}	0.066	0.282^{***}
	(0.098)	(0.054)	(0.049)
$Constant$	27.211^{**}	-	-1.821
	(13.646)		(6.802)
Observations	10,931	10,931	10,931
R^2	0.243	0.129	0.397

Source: Author's own elaboration.
Note: Standard errors in parentheses.
$^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table B.34: VIIT-L (γ = 25%/α = 15%)

	Dependent variable:		
	$lnImports(M)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.401^{***}	0.359^{***}	-0.240^{**}
	(0.255)	(0.134)	(0.120)
$lnGDP_i$	0.702^{***}	0.754^{***}	0.615^{***}
	(0.008)	(0.079)	(0.011)
$lnDist_i$	-1.053^{***}	-	-0.896^{***}
	(0.039)		(0.052)
$Border_i$	0.394^{***}	-	0.402^{***}
	(0.065)		(0.089)
ADP	0.003	-0.003^{***}	-0.001
	(0.002)	(0.001)	(0.001)
CVD	-0.049	-0.046^{***}	-0.040^{***}
	(0.033)	(0.015)	(0.014)
SG	-0.175^{***}	-0.152^{***}	-0.166^{***}
	(0.057)	(0.027)	(0.026)
SPS	0.0005	0.0002	0.0002
	(0.0004)	(0.0002)	(0.0002)
TBT	0.001	-0.0001	0.0004
	(0.001)	(0.0004)	(0.0004)
$Duty$	-0.099^{***}	-0.024^{***}	-0.062^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.410^{***}	0.242^{***}	0.345^{***}
	(0.049)	(0.024)	(0.023)
$Constant$	37.110^{***}	-	5.097
	(6.757)		(3.218)
Observations	46,225	46,225	46,225
R^2	0.211	0.064	0.384

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.35: VIIT-H (γ = 25%/α = 15%)

	Dependent variable:		
	$lnImports(M)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-0.898^{***}	0.438^{***}	0.302^{**}
	(0.277)	(0.167)	(0.147)
$lnGDP_i$	0.580^{***}	1.711^{***}	0.576^{***}
	(0.008)	(0.073)	(0.011)
$lnDist_i$	-0.565^{***}	-	-0.491^{***}
	(0.035)		(0.048)
$Border_i$	1.296^{***}	-	1.129^{***}
	(0.061)		(0.085)
ADP	0.004^{*}	-0.004^{***}	0.0005
	(0.002)	(0.001)	(0.001)
CVD	-0.003	-0.071^{***}	-0.040^{**}
	(0.036)	(0.019)	(0.018)
SG	-0.067	-0.115^{***}	-0.128^{***}
	(0.063)	(0.033)	(0.032)
SPS	-0.0003	-0.001^{**}	-0.0003
	(0.0004)	(0.0002)	(0.0002)
TBT	0.003^{***}	-0.0004	0.001
	(0.001)	(0.001)	(0.001)
$Duty$	-0.098^{***}	-0.008^{**}	-0.064^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.484^{***}	0.212^{***}	0.368^{***}
	(0.053)	(0.030)	(0.028)
$Constant$	20.784^{***}	-	-13.045^{***}
	(7.327)		(3.915)
Observations	39,883	39,883	39,883
R^2	0.189	0.114	0.389

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.36: HIIT (γ = 25%/α = 15%)

	Dependent variable:		
	$lnImports(M)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.122^{**}	1.122^{***}	-0.128
	(0.520)	(0.314)	(0.264)
$lnGDP_i$	0.684^{***}	0.695^{***}	0.630^{***}
	(0.017)	(0.180)	(0.020)
$lnDist_i$	-1.164^{***}	-	-0.933^{***}
	(0.072)		(0.086)
$Border$	0.857^{***}	-	0.737^{***}
	(0.115)		(0.142)
ADP	-0.004	-0.011^{***}	-0.006^{***}
	(0.004)	(0.002)	(0.002)
CVD	-0.147^{**}	-0.092^{***}	-0.097^{***}
	(0.068)	(0.034)	(0.032)
SG	-0.241^{**}	-0.244^{***}	-0.248^{***}
	(0.120)	(0.061)	(0.057)
SPS	0.0005	0.0004	0.0001
	(0.001)	(0.0005)	(0.0004)
TBT	0.003	-0.002^{**}	-0.0004
	(0.002)	(0.001)	(0.001)
$Duty$	-0.095^{***}	0.001	-0.073^{***}
	(0.004)	(0.007)	(0.004)
$lnIFDI$	0.430^{***}	0.170^{***}	0.380^{***}
	(0.099)	(0.056)	(0.050)
$Constant$	31.126^{**}	-	2.558
	(13.770)		(7.043)
Observations	10,931	10,931	10,931
R^2	0.237	0.107	0.394

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.37: VIIT-L ($\gamma = 25\%/\alpha = 15\%$)

	Dependent variable:		
	$lnTotalTrade(TT)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.440^{***}	0.341^{***}	-0.135
	(0.251)	(0.125)	(0.113)
$lnGDP_i$	0.692^{***}	0.878^{***}	0.604^{***}
	(0.008)	(0.074)	(0.011)
$lnDist_i$	-1.080^{***}	-	-0.929^{***}
	(0.038)		(0.051)
$Border$	0.432^{***}	-	0.447^{***}
	(0.065)		(0.088)
ADP	0.002	-0.005^{***}	-0.002^{**}
	(0.002)	(0.001)	(0.001)
CVD	-0.037	-0.031^{**}	-0.024^{*}
	(0.032)	(0.014)	(0.014)
SG	-0.170^{***}	-0.156^{***}	-0.171^{***}
	(0.057)	(0.025)	(0.024)
SPS	0.001	0.001^{***}	0.001^{***}
	(0.0004)	(0.0002)	(0.0002)
TBT	0.001	-0.001^{*}	-0.0002
	(0.001)	(0.0004)	(0.0004)
$Duty$	-0.098^{***}	-0.024^{***}	-0.060^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.411^{***}	0.179^{***}	0.282^{***}
	(0.048)	(0.023)	(0.022)
$Constant$	39.441^{***}	-	4.160
	(6.667)		(3.029)
Observations	46,225	46,225	46,225
R^2	0.214	0.065	0.433

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.38: VIIT-H (γ = 25%/α = 15%)

	Dependent variable:		
	$lnTotalTrade(TT)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-0.909^{***}	0.380^{**}	0.349^{**}
	(0.271)	(0.154)	(0.137)
$lnGDP_i$	0.569^{***}	1.719^{***}	0.564^{***}
	(0.008)	(0.067)	(0.011)
$lnDist_i$	-0.601^{***}	-	-0.531^{***}
	(0.034)		(0.047)
$Border_i$	1.321^{***}	-	1.152^{***}
	(0.060)		(0.083)
ADP	0.003	-0.006^{***}	-0.001
	(0.002)	(0.001)	(0.001)
CVD	0.004	-0.057^{***}	-0.028^{*}
	(0.035)	(0.017)	(0.017)
SG	-0.076	-0.137^{***}	-0.149^{***}
	(0.062)	(0.031)	(0.030)
SPS	-0.0003	-0.0003	-0.0001
	(0.0004)	(0.0002)	(0.0002)
TBT	0.003^{***}	-0.001	0.0004
	(0.001)	(0.001)	(0.0005)
$Duty$	-0.096^{***}	-0.009^{***}	-0.061^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.483^{***}	0.182^{***}	0.332^{***}
	(0.051)	(0.028)	(0.026)
$Constant$	22.432^{***}	-	-12.613^{***}
	(7.182)		(3.650)
Observations	39,883	39,883	39,883
R^2	0.194	0.121	0.439

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.39: HIIT (γ = 25%/α = 15%)

	Dependent variable:		
	$lnTotalTrade(TT)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.064^{**}	0.954^{***}	0.033
	(0.511)	(0.281)	(0.240)
$lnGDP_i$	0.671^{***}	0.970^{***}	0.620^{***}
	(0.016)	(0.160)	(0.019)
$lnDist_i$	-1.178^{***}	-	-0.955^{***}
	(0.071)		(0.084)
$Border$	0.912^{***}	-	0.796^{***}
	(0.114)		(0.140)
ADP	-0.004	-0.012^{***}	-0.007^{***}
	(0.004)	(0.002)	(0.002)
CVD	-0.137^{**}	-0.060^{**}	-0.065^{**}
	(0.067)	(0.030)	(0.029)
SG	-0.227^{*}	-0.248^{***}	-0.260^{***}
	(0.118)	(0.055)	(0.052)
SPS	0.001	0.001^{*}	0.001
	(0.001)	(0.0004)	(0.0004)
TBT	0.002	-0.002^{**}	-0.001
	(0.002)	(0.001)	(0.001)
$Duty$	-0.095^{***}	-0.004	-0.071^{***}
	(0.003)	(0.006)	(0.003)
$lnIFDI$	0.427^{***}	0.128^{**}	0.328^{***}
	(0.098)	(0.050)	(0.046)
$Constant$	30.746^{**}	-	-0.223
	(13.542)		(6.395)
Observations	10,931	10,931	10,931
R^2	0.244	0.135	0.444

Source: Author's own elaboration.
Note: Standard errors in parentheses.
$^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table B.40: VIIT-L (γ = 25%/α = 25%)

	Dependent variable:		
	$lnExports(X)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.529^{***}	0.364^{**}	-0.184
	(0.265)	(0.146)	(0.131)
$lnGDP_i$	0.678^{***}	0.930^{***}	0.583^{***}
	(0.008)	(0.088)	(0.011)
$lnDist_i$	-1.118^{***}	-	-0.985^{***}
	(0.040)		(0.054)
$Border_i$	0.303^{***}	-	0.379^{***}
	(0.069)		(0.093)
ADP	0.003	-0.007^{***}	-0.003^{***}
	(0.002)	(0.001)	(0.001)
CVD	-0.008	-0.025	-0.013
	(0.034)	(0.016)	(0.016)
SG	-0.152^{**}	-0.153^{***}	-0.168^{***}
	(0.060)	(0.029)	(0.028)
SPS	0.0003	0.001^{***}	0.001^{***}
	(0.0004)	(0.0002)	(0.0002)
TBT	0.001	-0.001^{***}	-0.001
	(0.001)	(0.0005)	(0.0005)
$Duty$	-0.100^{***}	-0.025^{***}	-0.064^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.414^{***}	0.117^{***}	0.240^{***}
	(0.051)	(0.027)	(0.025)
$Constant$	41.821^{***}	-	6.338^{*}
	(7.039)		(3.494)
Observations	41,883	41,883	41,883
R^2	0.208	0.046	0.379

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.41: VIIT-H (γ = 25%/α = 25%)

	Dependent variable:		
	$lnExports(X)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.050^{***}	0.395^{**}	0.276^{*}
	(0.281)	(0.173)	(0.152)
$lnGDP_i$	0.550^{***}	1.703^{***}	0.536^{***}
	(0.008)	(0.074)	(0.011)
$lnDist_i$	-0.576^{***}	-	-0.526^{***}
	(0.035)		(0.048)
$Border_i$	1.351^{***}	-	1.185^{***}
	(0.062)		(0.085)
ADP	0.004	-0.007^{***}	−0.001
	(0.002)	(0.001)	(0.001)
CVD	0.019	-0.041^{**}	−0.011
	(0.036)	(0.019)	(0.018)
SG	-0.107^{*}	-0.170^{***}	-0.180^{***}
	(0.065)	(0.035)	(0.033)
SPS	−0.0002	−0.0001	0.0001
	(0.0005)	(0.0003)	(0.0002)
TBT	0.003^{***}	−0.001	0.0004
	(0.001)	(0.001)	(0.001)
$Duty$	-0.093^{***}	-0.010^{***}	-0.063^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.487^{***}	0.144^{***}	0.311^{***}
	(0.053)	(0.032)	(0.029)
$Constant$	25.725^{***}	-	-10.444^{***}
	(7.431)		(4.034)
Observations	37,124	37,124	37,124
R^2	0.186	0.102	0.387

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.42: HIIT (γ = 25%/α = 25%)

	Dependent variable:		
	$lnExports(X)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-0.838^{**}	0.741^{***}	0.164
	(0.408)	(0.218)	(0.191)
$lnGDP_i$	0.657^{***}	1.309^{***}	0.594^{***}
	(0.013)	(0.121)	(0.016)
$lnDist_i$	-1.144^{***}	-	-0.925^{***}
	(0.057)		(0.071)
$Border$	1.031^{***}	-	0.861^{***}
	(0.092)		(0.119)
ADP	−0.005	-0.010^{***}	-0.006^{***}
	(0.003)	(0.002)	(0.002)
CVD	-0.113^{**}	-0.043^{*}	-0.040^{*}
	(0.053)	(0.024)	(0.023)
SG	-0.205^{**}	-0.229^{***}	-0.258^{***}
	(0.093)	(0.043)	(0.041)
SPS	0.001	0.001^{**}	0.001^{***}
	(0.001)	(0.0003)	(0.0003)
TBT	0.001	-0.002^{***}	−0.001
	(0.002)	(0.001)	(0.001)
$Duty$	-0.093^{***}	-0.017^{***}	-0.072^{***}
	(0.003)	(0.005)	(0.003)
$lnIFDI$	0.425^{***}	0.088^{**}	0.281^{***}
	(0.078)	(0.040)	(0.036)
$Constant$	23.687^{**}	-	−3.922
	(10.809)		(5.089)
Observations	18,032	18,032	18,032
R^2	0.235	0.118	0.411

Source: Author's own elaboration.

Note: Standard errors in parentheses. *p<0.1; **p<0.05; ***p<0.01

Table B.43: VIIT-L (γ = 25%/α = 25%)

	Dependent variable:		
	$lnImports(M)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.419^{***}	0.417^{***}	-0.234^{*}
	(0.265)	(0.143)	(0.128)
$lnGDP_i$	0.699^{***}	0.708^{***}	0.608^{***}
	(0.008)	(0.086)	(0.011)
$lnDist_i$	-1.068^{***}	-	-0.924^{***}
	(0.040)		(0.054)
$Border_i$	0.217^{***}	-	0.283^{***}
	(0.069)		(0.093)
ADP	0.003	-0.004^{***}	−0.001
	(0.002)	(0.001)	(0.001)
CVD	−0.037	-0.052^{***}	-0.044^{***}
	(0.034)	(0.016)	(0.015)
SG	-0.151^{**}	-0.146^{***}	-0.157^{***}
	(0.060)	(0.028)	(0.027)
SPS	0.0002	0.0001	0.0001
	(0.0004)	(0.0002)	(0.0002)
TBT	0.001	−0.0002	0.0003
	(0.001)	(0.0005)	(0.0004)
$Duty$	-0.101^{***}	-0.026^{***}	-0.065^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.410^{***}	0.240^{***}	0.343^{***}
	(0.051)	(0.026)	(0.025)
$Constant$	37.819^{***}	-	5.445
	(7.043)		(3.421)
Observations	41,883	41,883	41,883
R^2	0.212	0.062	0.388

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.44: VIIT-H (γ = 25%/α = 25%)

	Dependent variable:		
	$lnImports(M)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.050^{***}	0.506^{***}	0.320^{**}
	(0.285)	(0.176)	(0.154)
$lnGDP_i$	0.571^{***}	1.723^{***}	0.569^{***}
	(0.009)	(0.075)	(0.011)
$lnDist_i$	-0.503^{***}	-	-0.449^{***}
	(0.036)		(0.048)
$Border_i$	1.304^{***}	-	1.142^{***}
	(0.063)		(0.086)
ADP	0.005^{**}	-0.004^{***}	0.001
	(0.002)	(0.001)	(0.001)
CVD	-0.003	-0.071^{***}	-0.040^{**}
	(0.037)	(0.020)	(0.019)
SG	-0.089	-0.125^{***}	-0.139^{***}
	(0.066)	(0.035)	(0.034)
SPS	-0.0002	-0.001^{**}	-0.0003
	(0.0005)	(0.0003)	(0.0002)
TBT	0.003^{***}	-0.0004	0.001
	(0.001)	(0.001)	(0.001)
$Duty$	-0.096^{***}	-0.008^{**}	-0.064^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.490^{***}	0.206^{***}	0.367^{***}
	(0.054)	(0.032)	(0.029)
$Constant$	24.568^{***}	-	-13.761^{***}
	(7.548)		(4.101)
Observations	37,124	37,124	37,124
R^2	0.184	0.119	0.389

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.45: HIIT (γ = 25%/α = 25%)

	Dependent variable:		
	$lnImports(M)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-0.969^{**}	0.973^{***}	-0.036
	(0.411)	(0.226)	(0.197)
$lnGDP_i$	0.680^{***}	0.775^{***}	0.613^{***}
	(0.013)	(0.125)	(0.016)
$lnDist_i$	-1.091^{***}	-	-0.844^{***}
	(0.057)		(0.072)
$Border_i$	0.942^{***}	-	0.791^{***}
	(0.092)		(0.120)
ADP	-0.003	-0.007^{***}	-0.003^{**}
	(0.003)	(0.002)	(0.002)
CVD	-0.110^{**}	-0.074^{***}	-0.070^{***}
	(0.053)	(0.025)	(0.023)
SG	-0.228^{**}	-0.217^{***}	-0.236^{***}
	(0.094)	(0.044)	(0.042)
SPS	0.0004	0.0003	0.0001
	(0.001)	(0.0003)	(0.0003)
TBT	0.003	-0.001	0.0003
	(0.002)	(0.001)	(0.001)
$Duty$	-0.095^{***}	-0.008	-0.070^{***}
	(0.003)	(0.005)	(0.003)
$lnIFDI$	0.440^{***}	0.172^{***}	0.364^{***}
	(0.078)	(0.041)	(0.038)
$Constant$	26.119^{**}	-	-0.427
	(10.894)		(5.252)
Observations	18,032	18,032	18,032
R^2	0.228	0.104	0.410

Source: Author's own elaboration.
Note: Standard errors in parentheses.
$^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table B.46: VIIT-L (γ = 25%/α = 25%)

	Dependent variable:		
	$lnTotalTrade(TT)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.476^{***}	0.388^{***}	-0.151
	(0.262)	(0.134)	(0.120)
$lnGDP_i$	0.688^{***}	0.824^{***}	0.596^{***}
	(0.008)	(0.080)	(0.011)
$lnDist_i$	-1.093^{***}	-	-0.954^{***}
	(0.040)		(0.053)
$Border_i$	0.258^{***}	-	0.333^{***}
	(0.068)		(0.092)
ADP	0.003	-0.005^{***}	-0.002^{**}
	(0.002)	(0.001)	(0.001)
CVD	-0.021	-0.036^{**}	-0.027^{*}
	(0.034)	(0.015)	(0.014)
SG	-0.149^{**}	-0.149^{***}	-0.162^{***}
	(0.059)	(0.026)	(0.025)
SPS	0.0003	0.0005^{**}	0.0004^{**}
	(0.0004)	(0.0002)	(0.0002)
TBT	0.001	-0.001^{*}	-0.0002
	(0.001)	(0.0004)	(0.0004)
$Duty$	-0.100^{***}	-0.026^{***}	-0.062^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.412^{***}	0.179^{***}	0.283^{***}
	(0.050)	(0.024)	(0.023)
$Constant$	40.631^{***}	-	5.051
	(6.952)		(3.225)
Observations	41,883	41,883	41,883
R^2	0.214	0.062	0.436

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.47: VIIT-H (γ = 25%/α = 25%)

	Dependent variable:		
	$lnTotalTrade(TT)$		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-1.050^{***}	0.446^{***}	0.367^{**}
	(0.279)	(0.163)	(0.144)
$lnGDP_i$	0.561^{***}	1.727^{***}	0.557^{***}
	(0.008)	(0.070)	(0.011)
$lnDist_i$	-0.538^{***}	-	-0.489^{***}
	(0.035)		(0.048)
$Border_i$	1.328^{***}	-	1.166^{***}
	(0.062)		(0.085)
ADP	0.004^{*}	-0.006^{***}	-0.001
	(0.002)	(0.001)	(0.001)
CVD	0.008	-0.055^{***}	-0.025
	(0.036)	(0.018)	(0.017)
SG	-0.097	-0.145^{***}	-0.159^{***}
	(0.064)	(0.033)	(0.031)
SPS	-0.0002	-0.0003	-0.0001
	(0.0005)	(0.0002)	(0.0002)
TBT	0.003^{***}	-0.001	0.0004
	(0.001)	(0.001)	(0.001)
$Duty$	-0.095^{***}	-0.009^{***}	-0.062^{***}
	(0.002)	(0.003)	(0.002)
$lnIFDI$	0.489^{***}	0.175^{***}	0.331^{***}
	(0.053)	(0.030)	(0.027)
$Constant$	25.890^{***}	-	-13.344^{***}
	(7.393)		(3.827)
Observations	37,124	37,124	37,124
R^2	0.189	0.126	0.439

Source: Author's own elaboration.

Note: Standard errors in parentheses.
$^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table B.48: HIIT (γ = 25%/α = 25%)

	Dependent variable:		
	lnTotalTrade		
	Pooled OLS	FE - Within Estimator	Random Effects
	(1)	(2)	(3)
$lnGDP_{BR}$	-0.924^{**}	0.842^{***}	0.130
	(0.405)	(0.203)	(0.179)
$lnGDP_i$	0.668^{***}	1.041^{***}	0.605^{***}
	(0.013)	(0.113)	(0.016)
$lnDist_i$	-1.118^{***}	-	-0.885^{***}
	(0.057)		(0.071)
$Border_i$	0.982^{***}	-	0.826^{***}
	(0.091)		(0.118)
ADP	−0.004	-0.009^{***}	-0.005^{***}
	(0.003)	(0.001)	(0.001)
CVD	-0.113^{**}	-0.060^{***}	-0.056^{***}
	(0.053)	(0.022)	(0.021)
SG	-0.215^{**}	-0.217^{***}	-0.242^{***}
	(0.092)	(0.040)	(0.038)
SPS	0.0005	0.001^{*}	0.0005^{*}
	(0.001)	(0.0003)	(0.0003)
TBT	0.002	-0.001^{**}	−0.0002
	(0.002)	(0.001)	(0.001)
$Duty$	-0.094^{***}	-0.012^{***}	-0.067^{***}
	(0.003)	(0.004)	(0.003)
$lnIFDI$	0.437^{***}	0.135^{***}	0.315^{***}
	(0.077)	(0.037)	(0.034)
$Constant$	26.199^{**}	-	−3.270
	(10.717)		(4.775)
Observations	18,032	18,032	18,032
R^2	0.235	0.128	0.461

Source: Author's own elaboration.
Note: Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Table B.49: F Tests

	$lnExports$			$lnImports$			$lnTotalTrade$		
	VIIT-L	VIIT-H	HIIT	VIIT-L	VIIT-H	HIIT	VIIT-L	VIIT-H	HIIT
$\gamma = 15\%/\alpha = 15\%$	14.272***	12.072***	14.177***	15.455***	12.319***	14.028***	17.906***	14.540***	17.603***
$\gamma = 15\%/\alpha = 25\%$	13.666***	11.620***	15.165***	14.819***	11.921***	14.915***	17.138***	14.024***	18.676***
$\gamma = 25\%/\alpha = 15\%$	15.550***	12.416***	16.673***	16.367***	12.430***	15.674***	18.353***	14.054***	19.128***
$\gamma = 25\%/\alpha = 25\%$	14.858***	11.896***	17.740***	15.648***	11.988***	16.797***	17.524***	13.507***	20.336***

Note: *p<0.1; **p<0.05; ***p<0.01

Table B.50: Breusch-Pagan LM Tests

	lnExports			*lnImports*			*lnTotalTrade*		
	VIIT-L	VIIT-H	HIIT	VIIT-L	VIIT-H	HIIT	VIIT-L	VIIT-H	HIIT
$\gamma = 15\%/\alpha = 15\%$	88286***	61121***	11042***	90231***	57964***	10127***	93223***	62187***	10945***
$\gamma = 15\%/\alpha = 25\%$	75677***	54086***	25427***	76982***	51368***	24224***	79735***	55105***	25766***
$\gamma = 25\%/\alpha = 15\%$	61039***	40899***	7473***	62267***	39252***	7271***	63506***	41284***	7533***
$\gamma = 25\%/\alpha = 25\%$	52302***	36275***	17743***	53461***	34861***	17393***	54491***	36672***	17999***

Note: *p<0.1; **p<0.05; ***p<0.01

Table B.51: Hausman Tests

	$lnExports$			$lnImports$			$lnTotalTrade$		
	VIIT-L	VIIT-H	HIIT	VIIT-L	VIIT-H	HIIT	VIIT-L	VIIT-H	HIIT
$\gamma = 15\%/\alpha = 15\%$	661.2***	1075.1***	216.6***	782.2***	1218.8***	235***	780.3***	1367.4***	264.6***
$\gamma = 15\%/\alpha = 25\%$	595.1***	995.4***	386.2***	691.5***	1154.1***	441.2***	695.1***	1278.5***	481.5***
$\gamma = 25\%/\alpha = 15\%$	485.1***	783***	182.6***	545.3***	857.8***	194.9***	551.9***	914.8***	210.8***
$\gamma = 25\%/\alpha = 25\%$	427.2***	735.1***	313.1***	464.3***	813.3***	328.1***	479.8***	863.9***	355.6***

Note: *p<0.1; **p<0.05; ***p<0.01